

Successful Methods

Construction · Road Making · Engineering · Industrial Mining

THE J. G. WHITE COMPANIES

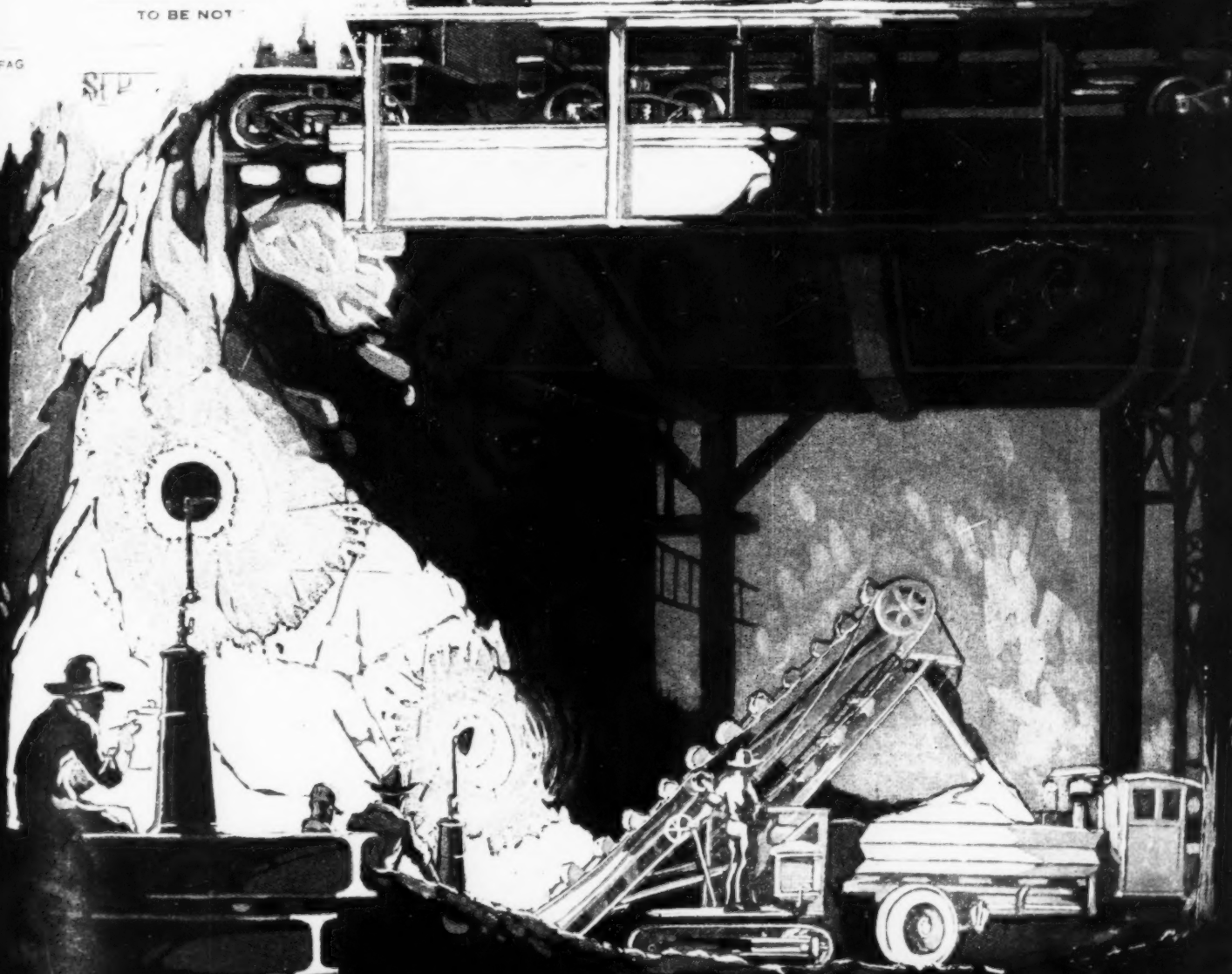
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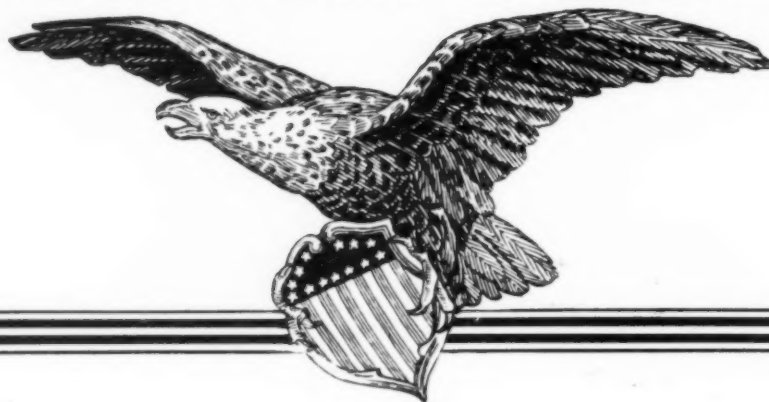
Beat Jack Frost

Vol. 2

September 1920

No. 9

The Farquhar Trade Mark ~ and *What It Means*



FOR nearly 60 years, we have been in the machinery manufacturing business.

The Farquhar line of steam power for contractors: Locomotive Engines and Boilers, Vertical, Single and Double Cylinder Traction Engines

Each year has seen our business expand and prosper—indisputable proof that the Farquhar policies are fair and sound, and that the machinery does the work for which it was purchased—dependably and economically.

We look back on this past with a great deal of pride, and value the good will established during these years, as a fundamental and vital part of the business.



Therefore, the name Farquhar will be most carefully guarded, and the Farquhar trade mark is, and will always be, your guarantee of the very utmost in quality, performance and service.

A. B. FARQUHAR & CO., Limited

Box 478

YORK, PA., U. S. A.



Successful Methods

A Magazine of Construction Service

Published by
MANUFACTURERS PUBLICITY BUREAU
INCORPORATED
140 South Dearborn Street, Chicago.

Vol. II

September, 1920

No. 9

BEAT JACK FROST

The only time to beat Jack Frost is before he turns up. If you wait until he arrives on the scene, you might just as well get ready to put up your hands and surrender without a fight.

But he can be beaten if you go to it now. Remember that this is September; that Jack Frost and Autumn are old pals who will sneak up on you before you know it. They are real experts when it comes to stalking their prey. And construction work is their meat.

So if you want to escape them, don't waste a minute. If the days are not long enough to get the work done, put on a night shift. Your machines don't mind night work; they can put in a twenty-four hour day without a word of complaint. If you want to beat Jack Frost, they are your best bet, and now is the time to cash in on them.

What about that road job you are doing? Isn't there any way you can speed it up? Don't let Jack Frost catch you with a few hundred yards unfinished that will have to go over until next spring. In addition to tying your hands until then, it will make everyone who tries to use the road in the meantime, heap curses on your head. Size up the situation now. No matter how hot the day may be, don't forget Jack Frost. He is on the way. Beat him to it.

*This Magazine Will Be Sent to Men Who Can Use It.
This Issue Has a Circulation of More Than 75,000*

EDITORIALS

Keeping Costs

ON another page appears an article by the chief accountant of an important accounting organization. He tells how a knowledge of costs obtained while the job is in progress, and not a month or so after it is finished, will help to check waste and enable the contractor to save money. He gives some valuable hints based on the experience of a Chicago contractor who put up a big hotel in record time, and kept a careful check on his costs every step of the way.

Many progressive contractors know their costs. Too many contractors do not. The latter wait until their anticipated profit begins to look like a loss and then cast wildly about trying to shut the door after the horse has been stolen.

That's bad business. The contracting business is too vital to the welfare of the nation to permit of such methods. If you don't keep track of your costs from day to day, begin now. You won't regret it for a moment.

Waterways

WITH every railroad jammed and freight piled high on every shipping platform in the land, the need for other means of transportation becomes apparent. One other means is the inland waterway, once exceedingly popular, but not used so much in late years.

That is why SUCCESSFUL METHODS prints in this issue an article about the New York barge canal. It can accom-

modate much more traffic per year than it has carried since its completion. It is a triumph of engineering and contracting skill that can do a big bit in helping out the present traffic crisis.

Saving the Labor of Men

FOR a long time SUCCESSFUL METHODS has been looking for an article like that describing the Illinois road job, which appears on page 6 of this issue. The fact that machines save the labor of men is known to everyone, but it isn't often that it is proved so clearly and conclusively as on this particular job.

In most cases the contractor gets most of his machinery before he begins work and so the saving in labor is largely a matter of conjecture. It is a case of "If I hadn't had this machine, I probably would have had to hire five more men."

On this job the machines didn't happen to be on hand when the work was begun. With the exception of the mixer, it was a man-power affair. And 45 men were required.

One by one, machines were introduced. Each effected a saving in labor and released men for other work. Now 17 men with a few machines are doing what it took 45 men to do before.

The lesson is obvious. The kind of machine isn't important if it saves labor. Study the needs of your job. See if you cannot release a few men for other work.

Industrial Railway Equipment on Illinois Road Job



FROM THE INDIES---EAST AND WEST



The upper photograph shows the arrival of some American wheelbarrows at an Indian port. The natives lose no time in getting to work with them.

The lower picture shows an American steam shovel crossing a bridge in Santo Domingo. The bridge is part of a road.

MACHINERY VS. MAN-POWER



At the left—Pile drivers operated by man-power in Japan. The tread wheels lift the heavy piles. The Japanese use both ancient and modern devices in construction work.

Below—On a construction job in San Francisco. Lifting concrete pile with 5 point suspension.



Above—The modern saw rig preparing lumber for building purposes in one of the cantonments constructed during the war.

At the right—Where man-power is cheaper than mills. Sawing lumber in a lumber yard in Seoul.



IN THE CONSTRUCTION FIELD

At the right—No need to worry about the water supply with this pump on the job.

Below—This is the way water is pumped from the Euphrates River in Mesopotamia. The buckets hold a little less than an ordinary barrel. This method of lifting water from the river is as old as civilization itself.



Above—Ten-ton roller at work on the beautiful Minnetonka Driveway near Minneapolis. This roller was used five months and ten days without any expense for repairs.

At the left—Where the women help with the road work. Twenty of them hauling a roller in India.



HOW MACHINES SAVE LABOR

A Practical Illustration of How Costs Are Being Cut on an Illinois Road Job by Reduction of Man Power



"WE started out on this job with a gang of 45 men, and now we have 17. And we are averaging 350 ft. of concrete road a day." So said Walter G. Leininger, superintendent for the Commonwealth Improvement Company, on a road job near Dundee, Ill. And a statement such as that inevitably called forth the inquiry, "How did you do it?" Here's the answer.

When the work was begun a mixer was about the only machine in sight. It was fed by a gang of men with wheelbarrows and shovels. They picked up the material from where it had been dumped on the subgrade by motor trucks, wheeled it to the mixer and kept up the weary round all day. As said before, it took 45 men, exclusive of the superintendent and the foreman, to keep the job going.

The first improvement was the installation of a tamping and finishing machine. That freed 5 men for work on the company's other jobs where they were sorely needed. Next came a change from wooden to steel forms and one more man's labor was saved.

The wheelbarrow brigade was still too big, however, and it held full sway until two bucket loaders and two small three-wheeled tractors equipped with dump bodies were put to work. Mr. Leininger figures that each loader saved 5 men and each tractor did likewise, a total saving of 20.

That's the story. From 45 men to 17 and still averaging 350 ft. a day and as much as 475 ft. on one record day.

It works this way. The aggregates are dumped on the subgrade by trucks, which first dump two or three piles of gravel and then an equal number of piles of sand. The bucket loaders, which are self feeding, are stationed one at the gravel piles, and the other at the sand piles. The distance between loaders and mixers is never allowed to become more than 200 ft., as experiment has shown that with the present equipment, that distance is the limit of efficiency.

The two small tractors with their dump bodies are kept in continuous service between the loaders and the

mixer. When one leaves the mixer, it backs down to the further loader, rolling the subgrade with its broad wheels as it does so, and gets its quota of gravel which is discharged through a measuring hopper. It then moves up to the other loader, gets its supply of sand in the same manner and goes on to the mixer, where the aggregates are dumped into the skip. The cement is piled along the side of the road in bags and is brought to the skip by wheelbarrows, 2 men taking care of that part of the work.

One of the great advantages of this exceedingly compact road plant is that it can be moved with little difficulty. The mixer, bucket loader, tractor and trucks all can move under their own power, and therefore if for any reason it becomes necessary to transfer them to another place the operation is a simple one. On the particular stretch of road where the work is now going on most of the grading was done early in the year and the former grading gang is now working in the gravel pits. The photograph at the top of the page shows the bucket loader and small tractors with the mixer in the distance. Since this picture was taken it has been found that it is more efficient to back the small tractors down to the bucket loader instead of turning them around.

When visited on a typical afternoon, the men on the job were distributed as follows:

- 2 men ahead grading
- 2 men operating 2 small tractors
- 2 men operating 2 bucket loaders
- 2 men bringing cement to mixer
- 2 men setting forms
- 1 man operating mixer
- 1 fireman
- 1 man distributing concrete when discharged from mixer
- 1 man operating finishing machine
- 3 men spreading soil for protective covering on finished road
- Total—17.

"And nobody has to hurt himself working on this job," said the fireman—which is pretty good testimony.

"And we don't need a camp any more," put in the foreman—which is another bit of evidence that costs are being cut.

THE ERIE CANAL MODERNIZED

New York's Great Inland Waterway Is an Engineering Triumph

BY GORDON P. GLEASON

TWO months ago **SUCCESSFUL METHODS** told the story of the building of the old Erie Canal. This month it tells the story of the Erie Canal's successor, the great barge canal, capable of playing a big part in the solution of the traffic problem which now confronts the nation.

The decision of the State Engineer as to the routes to be followed by the present waterway and the methods to be employed in its construction form an interesting cycle in the history of canal construction in the State of New York. As has been said, the world's first canal builders utilized the natural streams for channels, adapting them to their use by removing reefs and constructing dams and locks. The Erie and companion canals followed an entirely different principle and consisted of artificial channels located in the vicinity of the natural water-courses but remote enough to be out of danger during flood periods. These depended for their water supply on feeders from the streams which they crossed or paralleled, and were provided with towing paths, boats being hauled through the channels by means of animal power.

The present improvement goes back to the natural streams, wherever possible, and obtains navigation by a system of canalization consisting of dredging these

streams to the required depth and the creation of a series of pools formed by dams and connected with one another by locks. Boats navigating them must depend upon mechanical means for propulsion, no towpath being provided.

The problems presented by the Barge Canal construction work have been both numerous and difficult of solution. These canals have a minimum depth of 12 ft. and a variable width of from 75 ft. in the bottom of earth sections of the artificial channel to 200 ft. in the beds of the canalized rivers and lakes forming the major portion of the new system. They also run through a highly developed territory and their construction involved interference with privately owned developments and enterprises representing practically every variety of investment. Forty dams are required in carrying out these plans. There are 87 railroad crossings over the line of the canal and with 10 exceptions these had to be adapted to meet new requirements, either the taking out of the piers, the underpinning of the abutments or the building of new structures being necessary, and all without interfering with railroad traffic.

More than 250 highway bridges have been built across the waterway. Dredging operations in rivers and



GOVERNMENT STEEL BARGES USING THE CANAL. EACH HAS A CAPACITY OF 650 TONS.



DURING CONSTRUCTION: GIANT EXCAVATORS AT WORK.

excavations in the land line involved the removal of 100,000,000 cubic yards of material and the utilization of some of the most highly developed forms of excavators and dredges obtainable. Then again the contractors had to blast their way through massive rock sections in the western part of the State and through the canalized Hudson River north of Troy. At places where the canal runs through cities it was necessary to protect nearby buildings and manufacturing plants from undermining while coffer dams and, on occasion, stream diversion had to be resorted to in order to protect the unfinished structures from the sudden floods to which the streams are subject. Approximately 3,000,000 cu. yd. of concrete were placed.

In the case of a canal formed by the canalization of natural rivers, interest in the locks is shared by that shown in the dams whereby the streams are converted into a series of pools. In all canal work in the State prior to 1903 the locks were operated by hand both the gates and the valves being opened or closed in this manner. The lock gates were, with the exception of a few of the upper gates, known as "miter gates" the exceptions being those which were submersible and which were called "tumble gates." The valves were of a type known as "the butterfly" and were located in the gates.

The first locks were built of wood and because of the fact that the timbers were subject to extremes of dryness and dampness, had to be rebuilt frequently. Sometimes the lock walls were constructed of stone filled timber cribs backed by embankments of earth. As the canals became more prosperous these types were replaced by masonry structures, some being built of beautifully carved cut stone.

All modern Barge Canal locks are built of concrete. Their steel gates are operated by electricity. Culverts, running through the side walls of the structure with ports opening into the lock chamber near the floor supply the water used in filling and emptying the chamber, the flow of water being controlled by electrically operated slide valves. There are 57 locks on the new waterway, each being 328 by 45 ft. and having a maximum capacity of 3,000 tons, the lift varying from 6 to 40½

ft. Each represents an expenditure of from \$200,000 to \$300,000.

Although the early canals were, in some cases, carried across the streams in pools formed by low fixed dams, bridges being provided for the accommodation of the animals towing the boats, most of the crossings were made on aqueducts. These were, for the most part, excellently constructed on cut stone arches, some of them being notable for their beauty of design and the stability of their construction. The aqueduct over the Seneca River near the Montezuma Marsh described in the April issue of *SUCCESSFUL METHODS* was one of the most notable examples of this sort of work.

The modern canal dams are of two types, namely, fixed and movable. The canalization of the Mohawk River alone involves 12 dams, 4 of which are of the fixed type. These are located at Vischer's Ferry and Crescent, just above the Waterford series of high lift locks at the eastern terminus of the system, and below Little Falls. The movable dams, located between them, are unique in canal construction in the United States. These are known as movable dams of the bridge type and are modeled after a structure built in the Moldau River near Prague, Bohemia. They consist of a series of trusses spanning the channel of the river and supported by abutments and piers which have been built at intervals across the stream.

These look like steel bridges, but from the downstream side of each are suspended steel frames the bottoms of which rest in a concrete sill extending across the bed of the river, while the upper ends are connected with the superstructure by means of hinges. On each pair of frames or guides, are operated gates of heavy metal sheets so connected that when lowered in place a dam is formed which holds the water in the river above at the desired elevation. The upper row of gates form the crest of the dam and are smaller than the others. Both the gates and frames are raised or lowered by means of electric winches located on the bridge floor of the dam, and by operating the gates the operators can maintain the water levels



A SECTION OF THE FINISHED CANAL. MINIMUM BOTTOM WIDTH OF CHANNEL IS 75 FEET.



ONE OF THE TAINTOR GATES RAISED.

within close limits under all conditions. In the winter months both gates and frames are raised to a horizontal position under the bridge floor of the dam, thus leaving an unobstructed channel and guarding against floods which otherwise would menace the nearby country.

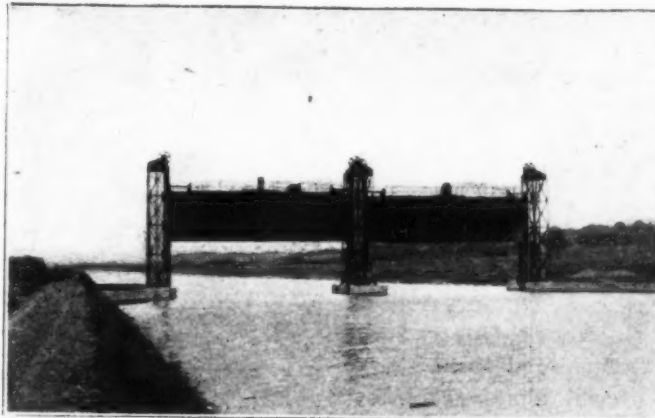
Other dams of the movable type are provided with sector or Taintor gates, the number of gates used depending upon the location in which they have been placed. At Waterford, on the eastern terminus of the Champlain branch of the system, there are 6 of these gates, the largest of their type in the world.

The largest two dams constructed in connection with the Barge Canal are located at Delta and Hinckley in the Adirondack watershed and act as storage reservoirs for water which is used to maintain the 12-foot depth in the eastern section of the Erie Canal. The Delta dam is a massive concrete structure 100 ft. high, 1,100 ft. long and provides for the storage of 2,750,000 cu. ft. of water. The Hinckley dam, which is mainly an earthen structure with a concrete core wall, is 3,700 ft. in length and has a reservoir capacity of 3,445,000,000 cu. ft. of water.

At points along the channel there have been provided guard gates of the lift type. These are supported on a heavy steel frame work set on concrete pedestals. The gates are counterweighted so carefully that their quick operation, in case of necessity, is rendered easy. By means

of these, damaged sections of the channel may be effectively isolated and repaired. Gates of this type are located at distances of 10 miles in the land line, and at points where the artificial channels join the canalized river sections or lakes.

Numerous other structures such as siphon spillways, waste weirs, current breakers, approach walls, etc., are located in the canal and two years' operation of the completed system has demonstrated that these not only have fulfilled their mission but have done more, in that they have tended to make navigation on the river sections as simple a matter as it was on the old land lines which constituted the State's first Canal System. The total cost



ONE OF THE BIG GUARD GATES

of this modern waterway has been \$155,000,000 of which \$19,800,000 is represented in terminals and terminal equipment, 55 modern public terminals being provided by the State to speed the transfer and provide for the storage of freight.

This channel has been designed for the movement of upwards to 20,000,000 tons of freight during each navigation season. The Barge Canal, itself, has been proved a structural success. Those who have made use of it and the practical boatmen whose fleets operate upon it have been loud in their praise of what engineering authorities, the world over have hailed as "The World's Greatest Inland Waterway."



THE OLD WAY AND THE NEW. THE OLD ERIE CANAL WAS CARRIED ACROSS THE MOHAWK RIVER BY THE STONE AQUEDUCT, WHICH HAS SINCE BEEN REMOVED. THE PRESENT BARGE CANAL USES THE RIVER CHANNEL AT THIS POINT.

ONE-MAN ROAD JOBS



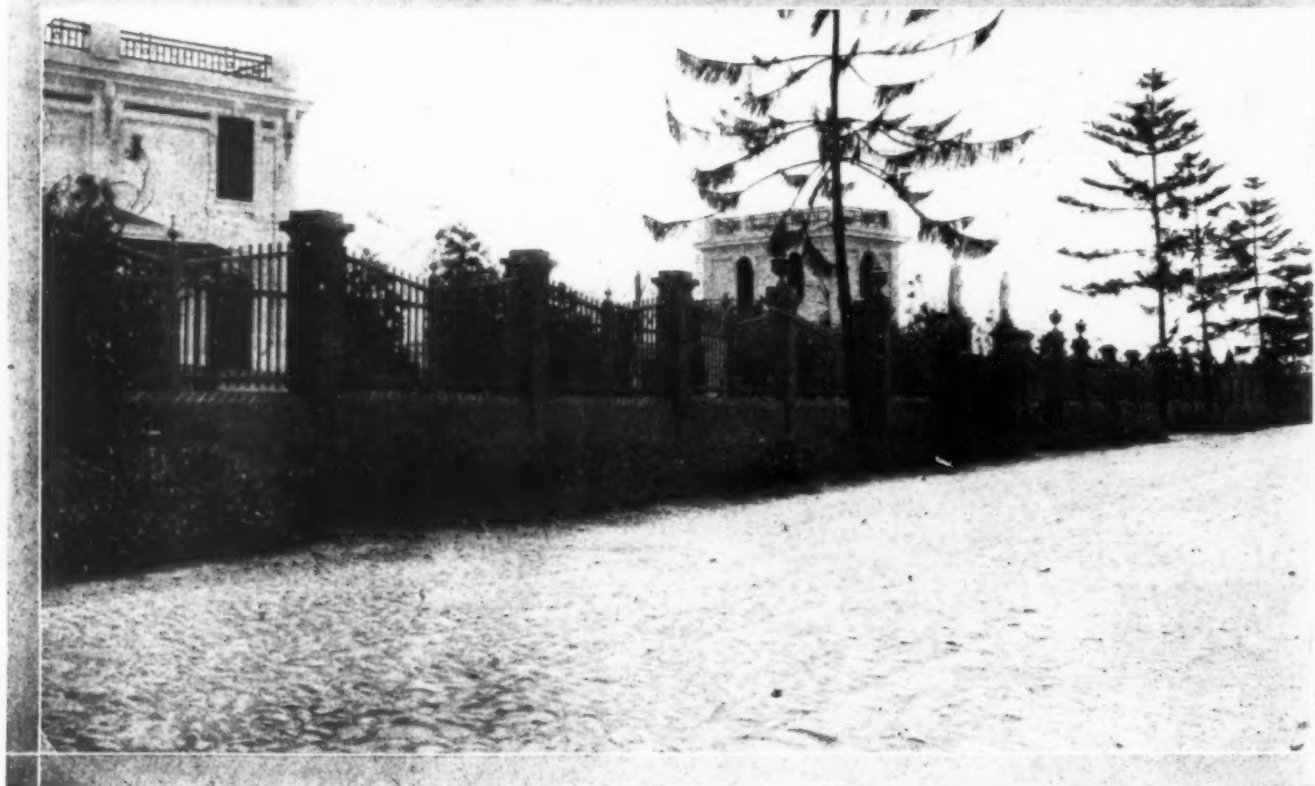
Above: One-man road material haulage plant in Peru.

At the right: A modern roller building granite block pavement in Lima, Peru.



Above: Peruvian one-man road paving plant.

Below: Close-up view of single-course cobblestone pavement.



ROAD BUILDING IN PERU

BY S. T. HENRY

LABOR and climatic conditions in Peru permit road building methods quite unusual to American engineers and contractors. Outside of the few cities along the coast there are practically no improved roads. In Lima and one or two other cities considerable road and street surfacing has been done, but most of this is of a temporary character. The rapid increase in the number of automobiles in Peru in the last few years has brought about a great demand for better roads and streets. The high prices that have been obtained since 1915 for Peruvian cotton, sugar and other products also have brought great private wealth into the country. The result is that large owners of land are anxious and able to finance road building work.

The coast of Peru is absolutely arid. There is not a limited rainfall—there *never* is any rain. There also is never any frost along the coast, where the principal cities are located, and where the highly-developed irrigated agricultural sections lie. These two great enemies of an improved road—water and frost—therefore do not have to be considered by the Peruvian highway engineer.

One of the commonest forms of pavement in Lima and the coast cities of Peru is a single course of cobblestones laid by hand on the natural surface. The spaces between the stones are simply filled in with dirt, and the pavement is compacted by traffic.

The photograph of the Avenida de Ejercito on this page shows a stretch of single course cobblestone pavement. Along both sides of this pavement are irrigation ditches which maintain the trees and shrubs seen in the

photograph. Outside of the irrigation ditches is a natural-surface roadway at each side for heavy horse-drawn traffic. The central paved roadway is reserved for motor traffic.

The appearance of this class of pavement under such traffic is shown in the close-up photograph with the fence in the background on the opposite page. Incidentally, attention might be called to the fact that the base and posts of the fence and the buildings in this photograph are made of mud.

Although this class of pavement stands up fairly well under motor traffic, it is difficult to maintain under horse-drawn traffic. The difficulty is increased by the fact that practically all hauling in Peru is done in two-wheeled carts. Loads as heavy as 6 tons are put on a single two-wheeled cart. These carts have 4-in. tires and are drawn by from 1 to 7 horses or mules. Nothing except a rigid pavement will stand up under such traffic.

The photograph showing the road roller is of a granite block pavement laid on a concrete base in Lima. There is little of such pavement in any of the Peruvian cities. Where it has been laid with the joints properly filled with cement it has stood up remarkably well.

The methods employed in building the single course cobblestone pavement are as simple as the pavement itself. We hear a good deal these days from American manufacturers about the limited number of men required to operate their road building plants. One of the photographs shows a one-man road material haulage plant. A band of 4 to 7 burros is driven by each man. The cob-



THE AVENIDA DE EJERCITO IN LIMA—PAVED WITH COBBLESTONES

blestones are loaded by hand into the sacks on the burros' backs. They are carried in this manner various distances up to $1\frac{1}{2}$ miles. Each burro carries about 200 lb. of stones. On arrival at the point where the stones will be used the sacks are simply pushed off by hand.

Another example of the limited amount of labor required in operating a paving plant is shown in one of the photographs. Each man works by himself with a pick, a shovel and a knife-like instrument with a hook on the end, which may be seen in the right hand of the man on the picture. He prepares his own subgrade, lays the pavement, tamps it into place with his feet and back-fills it from the irrigation ditch along the side by hand with his shovel. No American manufacturer has yet

been able to produce so simple a paving plant, nor can any American highway engineer use a pavement of the type built in this way which gives really remarkable service under Peruvian conditions.

Within the next few years there is almost certain to be a great amount of highway construction in Peru. A concrete road 23 ft. wide is about to be built from Callao, the port of Lima, to the latter city, a distance of 7 miles. The preliminary studies for this road have been made by W. G. Spaulding, an American engineer, who has had extensive experience on road and street work in the Panama Canal zone. Mr. Spaulding probably will have charge of the construction for the Peruvian government.

EXPANSION JOINTS IN LARGE CONCRETE BUILDINGS

SINCE the work of Considère, the noted French authority on cement, it has been a well-known fact that the more cement contained in concrete the greater will be the change in dimension:—this change being in proportion to the amount of cement per unit volume, the sand and stone being unaffected. It is also a familiar fact that unless thoroughly reinforced, concrete will shrink sufficiently to develop large and unsightly cracks. As a result expansion joints are provided to take care of this condition in long retaining walls, quays, or sea walls; these joints being provided every 25 to 50 feet.

In large concrete buildings however, the expansion joint is not so familiar. G. W. Maker, of Aberthaw Construction Company gives some interesting information along this line. He says:

"Some engineers advise that expansion joints should be provided every 100 feet to take care of the contraction and expansion of structures built of concrete. However, there can be found in nearly every city of magnitude concrete structures 300 feet long constructed without expansion joints which have successfully withstood the changes due to variations in temperature and humidity. These structures indicate that if proper attention is paid to the method of reinforcement the difficulty can be overcome within wider limits than 100 feet.

"Examples can be found of structures 400 feet long that have shown no severe cracks after having passed through the intense heat of two summers and the severe cold of winter.

"In general, however,

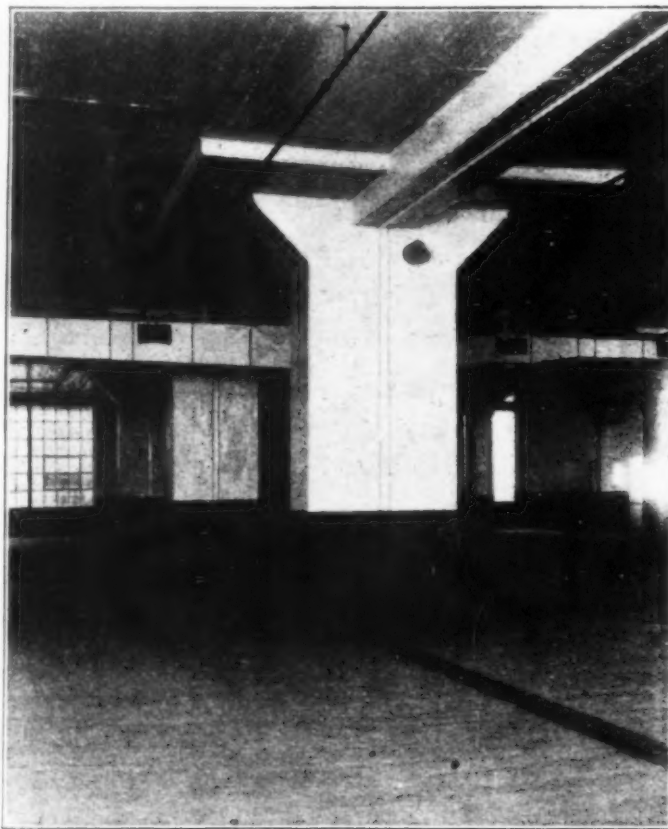
long, expansion joints should be provided. These joints should completely separate the buildings one from the other so that the different units will be free to move independently and of their own accord. This should preferably be done by means of double columns and double beams. The columns may rest upon the same footing as the movement would be practically negligible below the ground.

"The adjacent column and beam should be cast after the forms for the first have been removed. In order to prevent the weather from coming through the space between the outside wall columns and the roof beams, metal diaphragm should be provided of either sheet lead or copper. This should be bent in the form of a "V"

so as to allow it to expand as the two different units of the building move. The joints at the floor level should be protected by angle guards which prohibit the edge of the concrete from being broken. Sliding plates should be provided to prevent the dirt from sifting through to the floor below.

"Another method of accomplishing this same result in providing a successful weather stop for the columns is to cast two grooves in the first section approximately 3 in. by 3 in. and coating with paint or pitch. In building the next section a tongue is formed by the concrete entering the grooves previously left."

The illustration shows such a piece of work, constructed by Aberthaw Construction Company. The angle guards at the floor, and the double columns, as the ceilings, may be seen.



THIS PHOTOGRAPH SHOWS HOW THE EXPANSION JOINTS ARE INSTALLED

for buildings over three stories high and over 300 ft. well as the protection at the

KEEP YOUR COSTS

A Careful Check on all Items Will More Than Pay For Itself—A Record Breaking Job in Chicago

By JAMES J. REDDING

Chief Accountant, Richards Audit Company

At the present time it is almost impossible to have buildings erected on Lump-Sum contracts. Therefore, the Cost-Plus-Fixed-Fee, Fixed-Fee and Lump-Sum-

up. If the cost overruns, steps can be taken immediately to have the costs reduced, or at least to ascertain the reason for the fluctuation. Another advantage in having a modern cost system on the job is that the general contractor would not be required to finance the project for several months without being reimbursed, as the system should be so laid out that it would be possible to reimburse the general contractor within twenty-four hours after he has presented his voucher.

A strict interpretation of the contract and specifications is not always desirable, for it often happens that if the general contractor were to follow the specifications and contracts and interpret them literally, the owner would be put to an additional expense, whereas, if the construction accountant on the job is a man of experience, he will give a practical interpretation, thereby saving the owner needless expenditures, and at the same time, enabling the general contractor to do a good job at a minimum of cost.

I have in mind one particular job on which the accountant in charge and the architect's superintendent ruled that rubber boots and raincoats were to be furnished by the general contractor. These items were not furnished when necessary, and the employees were unable to unload the cars of building material during rainy weather. As a result the owner was obliged to pay considerably more than



OCTOBER 20, 1919

Fixed-Fee contracts with the Bonus and Penalty clauses are more practical, and, when the owner, architect and general contractor have a complete understanding the work is carried on expeditiously and at a minimum of cost to the owner.

In the past it always has been more practical to erect buildings on Lump-Sum contracts, and it has been argued that the Cost-Plus contracts during the war tended to promote waste rather than efficiency and lower costs. No doubt there have been good reasons for some of the arguments advanced, but I believe that most of the criticism is irrelevant and that a better and cheaper structure can be erected on one of the contracts mentioned above.

It also has been argued that the continued fluctuation in prices during the last year has rendered all cost figures valueless and that it is useless to attempt to determine costs. A comparative progress and cost report, such as is furnished with any good cost system, will enable the executive to check the cost of excavating, of building forms on the first floor against the cost of building them on any of the other floors, and of laying bricks from day to day, as well as the cost of pouring columns and slabs by sections and floors. These costs can be compared on the building in the course of erection or checked against the figures on other buildings which may be going



JANUARY 6, 1920



APRIL 29, 1920

the cost of the boots and raincoats in demurrage charges, besides the amount of time lost by this false economy.

Cost Hints from Hotel Somerset Job

The record made in erecting the Hotel Somerset was not the only accomplishment. Considerable money was saved by the owners and the general contractor.

The secret of the whole success lies in the fact that the hotel was constructed on a straight Cost-Plus contract, with a complete construction accounting system on the job, giving the owner and general contractor the following information:

1. A careful and accurate check of the time and material, thus ascertaining the quantities entering into the work and eliminating any possibility of "padding" the payroll.
2. The correct amount of premium charged against the job by properly applying the payroll against the classification as provided in the liability insurance policies.
3. A complete check of the Remainder Roll (Unclaimed Wages) so that all unclaimed wages were accounted for.
4. A correct interpretation of that part of the contract pertaining to Plant Equipment.
5. A daily progress and cost report and a monthly comparative progress and cost report.
6. A systematic manner of handling additions and deductions so that they were authorized and recorded before actually proceeding with the work.
7. A progressive record of changes in the date of completion.
8. A systematic and accurate method of checking and recording applications for reimbursements.
9. The total amount of credit to cover the discount received on material purchases.
10. An accurate accounting of empty cement sacks and other containers.
11. A weekly reconciliation of the petty cash and payroll accounts.

On another job the general contractor had \$200,000 in payrolls outstanding, due to the fact that the system was so complex that the accountant on the work was not able to audit his vouchers. Consequently he was obliged to obtain loans on short-term notes in order to finance these payrolls. His contract did not provide for reimbursement of interest on borrowed capital and he was obliged to bear this expense himself. On the same job it also developed that the owner lost all of the cash discount, for it was ruled that the general contractor should have been reimbursed promptly, enabling him to pay the invoices for material purchased within the required time. Thus it can be seen that a system providing for the prompt reimbursement of the general contractor after his vouchers are presented would make his work more efficient.

With the advent of the Fixed-fee forms of contract with the bonus and penalty clause, the question of the amount to be retained has caused considerable discussion, as it very often operates as a burden to the contractor. This is brought about by the fact that the percentages vary from 10 to 50 per cent, according to the percentage of bonus or penalty. And if the system does not provide for a check of the work up to the minute, thus guaranteeing a measure of safety and authorizing the accountant to retain only that part which is necessary, he must retain the full percentage. A complete cost system also would enable the accountant to make a prompt adjustment at the completion of the work.

There is another point which has been the source of much trouble to contractors, as it relates to all forms of contracts, and that is the clause, "The general contractor shall not be responsible for causes beyond his control."

This clause is not incorporated in all construction contracts executed, but after making an exhaustive in-

vestigation, I feel that there is considerable justification to the claim advanced by the general contractors that it should be inserted in all contracts for the reason that a general contractor when submitting a Lump-Sum figure can only take into consideration conditions existing at that time. And as it is apparently always the idea of the contractor to perform the work according to the plans and specifications and to give the owner a satisfactory job at a minimum of cost, he should not be held responsible for circumstances over which he has no control.

With a good cost accounting system on a job all the accounting is handled uniformly and there would be no such a case as handling a transaction one day one way and another day another way. Of course, exceptions would have to be made for emergency cases, but these should be held to a minimum by always having some one handy to give the necessary authorization.

From the monthly comparative progress and cost report it is possible to include unfinished contracts in the Income Tax Return, and feel at least that the profit or loss shown is reasonably accurate. Of course, the more practical way is to make the return on the basis of finished contracts.

So much has been written about cost systems on construction work that almost anything on that subject has the appearance of being stereotyped. Therefore, the readers of *SUCCESSFUL METHODS* will no doubt be interested in a concrete example of what can be accomplished by having a modern cost system on construction work. The photographs on the preceding page are of the Hotel Somerset erected at Sheridan Road and Argyle St., in Chicago, by Paschen Brothers with Samuel N. Crowen as architect. This job was done on record time and at a minimum of cost.

ADVERTISE YOUR BUSINESS

Let Your Employees Know Who You Are and What You Are Doing

BY DANIEL J. HAUER
Construction Economist

"NO sir, I can't tell you the contractor's name," answered the laborer. "I have been working here two weeks and I have never heard it. 'Big Bill' is what they call the walking boss. He gives us the pay envelopes, but all they have on them is our name and the amount due."

We had been traveling for more than 10 miles along a road that was being rebuilt, having made several detours only to come back to the main road to find it torn up again. Not a sign either at the detours or upon any of the machinery being used. The work had modern equipment upon it and seemed to be going on with vim, but never a sign or name to show who was the contractor.

At last under a shade tree we saw a young man resting. He was the state highway inspector, so we stopped to quiz him and learned that two contractors were doing this road job. He gave the name of each and we found that both were well known in several states as successful road builders. Yet, neither deemed it of sufficient importance to have his name painted on his equipment or upon his detour signs.

Contrast this with other road companies, who have their names on all machinery with the machine's serial number. The photograph on this page shows a steam

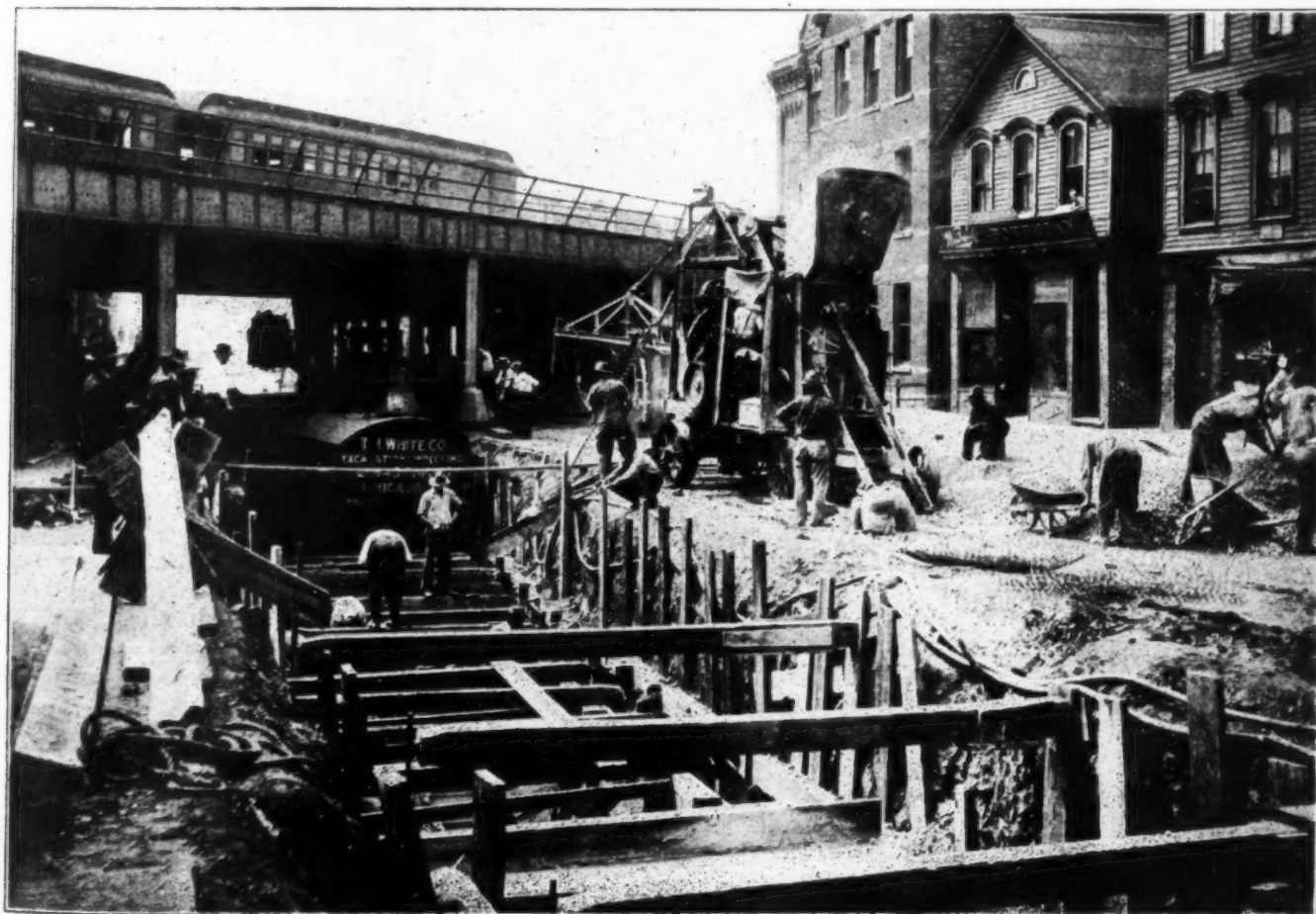
shovel almost out of sight in a trench, but the contractor's name still shows.

Every mixer, boiler, wagon, truck, roller and all small machines owned by up-to-date contractors have signs on them and their names and numbers kept bright. Besides, on telegraph poles and in other prominent places large signs are used telling the world the name of the man who is doing the job.

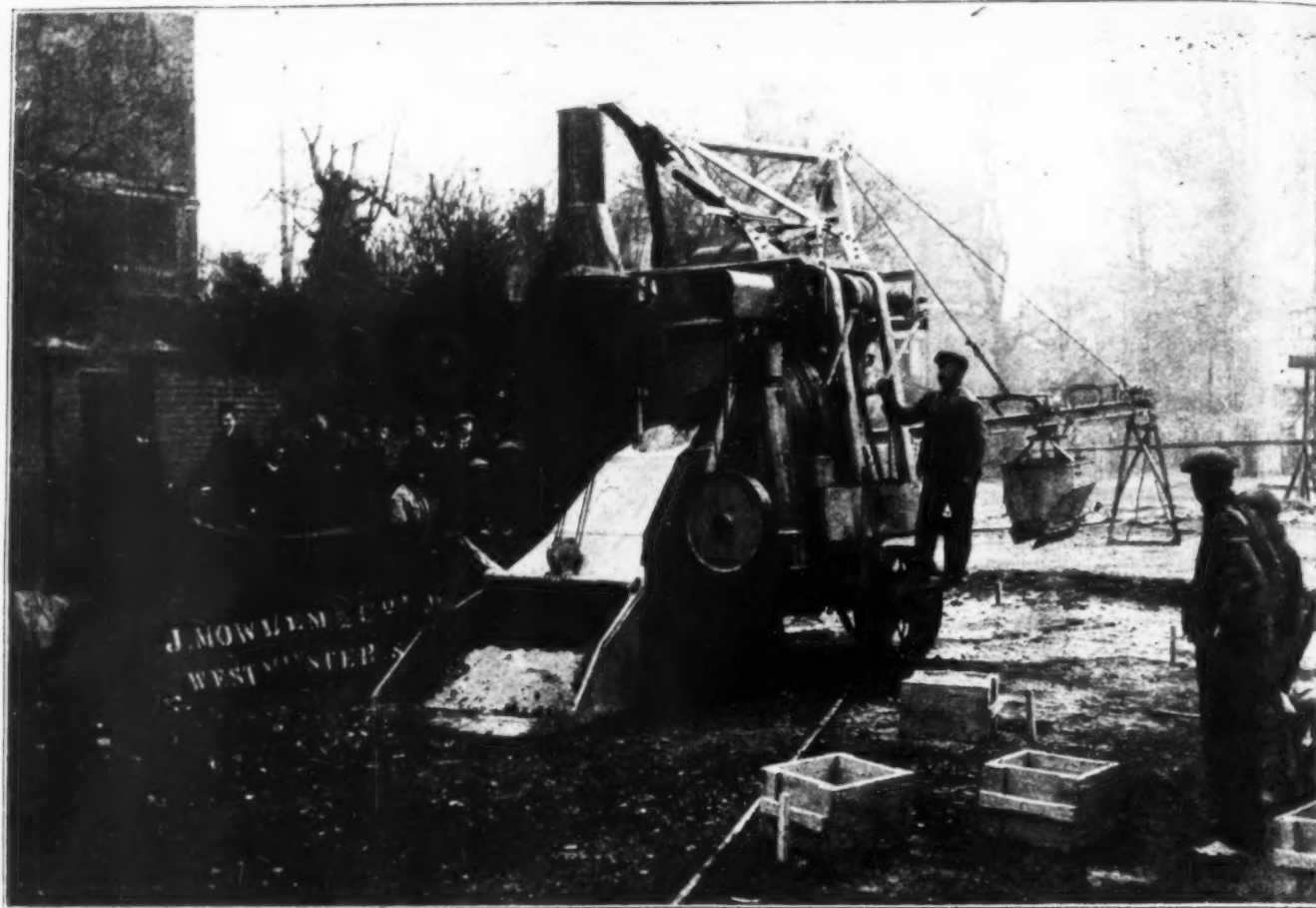
Signs indicating that the road is closed or pointing out a detour bear the same inscription. The large signs on the poles are left after the construction is finished and act as an advertisement for years, many times causing a demand from communities for similar roads.

Nearly every one in business today agrees that advertising pays. A construction job always attracts the attention of the thousands who pass by, yet it is surprising how few are the contractors who take advantage of this wonderful opportunity for publicity.

Many men working for contractors do not know their employer's name, as in the case of the man referred to in the beginning of this article. The writer in visiting hundreds of jobs throughout the country has found laborers and foremen who did not know the name of their employer. Little wonder that many such men care little for their employer's interest and whether or not honest



ALMOST OUT OF SIGHT, BUT THE CONTRACTOR'S NAME STILL SHOWS.



AND OVER IN LONDON THE CONTRACTOR MANAGES TO KEEP HIS NAME IN VIEW

work is done or money is made. Just as the laborer stated, the contractor cared so little about making his identity known to his employees that he did not have his name printed on his pay envelopes. In conducting large operations it is almost impossible for a contractor to know all of his employees, but it is an easy matter for him to be known to all of his men if not by sight, at least by name and reputation. Signs on the machinery and on the work not only serve as an advertisement to the public but also acquaint the employees with the employer. They give the men in the organization a certain pride in the work. They even lead many of the best men to speak of the work as "our job" and refer to the contractor by name, thus teaching them to speak in terms of "we" and "us." This means much in these days. It means loyalty to the contractor and pride in the job.

Every man is interested in his pay envelope, and although some few empty it and throw it away instantly, yet the majority carry it away, sometimes keeping a part of their money in it for days. If an "ad" on a letter envelope is of value, surely one on a pay envelope can give returns. This envelope gives an easy means of communication with the employee and if a different message is carried to them each week, it helps in the work of building up morale.

The contractor's name and address can always be on the envelope, leaving the rest of the space on the two sides available for talks on safety first principles, on the interest the contractor has in his men, where saving accounts can be opened, store accounts run, how mistakes in pay can be corrected, how and where doctors can be obtained in case of injury or sickness, how men can

secure promotion and a hundred other messages that will strengthen the relation between employer and employee.

The cost of this is little. It can be divided between the contractor and others such as savings banks, insurance agents, dentists, doctors, store keepers and others. The envelopes can be printed or the message put on with a rubber stamp, a manifold machine or other duplicating apparatus. An office boy or clerk in spare time can work up thousands of envelopes. It means advertising a business to employees and through them to others.

Another means of advertising is that of identification buttons or pins used by the men. These can bear the contractor's name and also distinguishing colors. Many workmen keep these on their hats or coats even when they are not working, thus advertising their employer.

Cost and time reports also should bear the name of the contractor. This is some help in advertising. Envelopes that are used to send reports, payrolls, letters and other things from the job to the contractor's office should bear the name of the firm and the address printed upon them in large type. This not only prevents letters from being lost or delayed but likewise assists in making the contractor better known.

No matter what kind of a structure is being built, it is a wise policy for a contractor to place a sign board upon the work. If there are several avenues of approach, a sign should be placed at each one. In building construction it is an easy matter to use a sign, as it can be attached to the building or scaffold or on the barrier built around the structure, the fence barrier being used for a large sign or for a number of them.

For large engineering jobs it is generally necessary to erect posts to hold the signs, but at times they can be attached to trees, poles and other things already there.

High concrete hoisting towers afford an excellent place to display signs.

The wording of signs is important. If possible, the wording should be such as either to call special attention of the public by some catch phrase or else to carry some special message that may be the means of obtaining future business. It is also advisable to give by means of a sign the name of the job being built. If the two signs are combined in one, the objection to this is that the sign cannot be used again except by repainting, so it is advisable to use two signs, one for the structure, which must be repainted, and the other for the contractor, which can be used over again on other jobs.

Another means of advertising is by photographs of work either finished or under way. Of course, such photographs labeled and framed look well in a contractor's office, but are seen only by the few who go there. It is possible, though, to have them displayed in public places, provided they are made up in attractive form. Some merchants will allow them to be placed in their show windows, especially in towns and smaller cities, as they are the means of attracting passers-by.

Agents and manufacturers of machines are glad to use such photographs if they show their machines on

fully through the engineering and trade papers. To obtain the best results, more than a publicity card should be carried. In other words, the "ad" should tell a story. This can be done with photographs or reading matter or combination of the two.

A story of speed, or saving money, of special service, of a good form of contract, of a job of magnitude or a combination of several of these features will prove of value. One contractor's advertisement reads as follows:

ALBERT AS YOUR BUILDING DEPARTMENT

Through a unit suborganization, made up by careful selection from our permanent force, we furnish and control all labor, purchase all materials, and let all sub-contracts for your construction work. There is no divided responsibility; your interests and ours coincide in the effort to secure the best results. Our compensation is measured by the service rendered. In this manner we have acted repeatedly as the building department for many clients. In similar manner we can serve you.

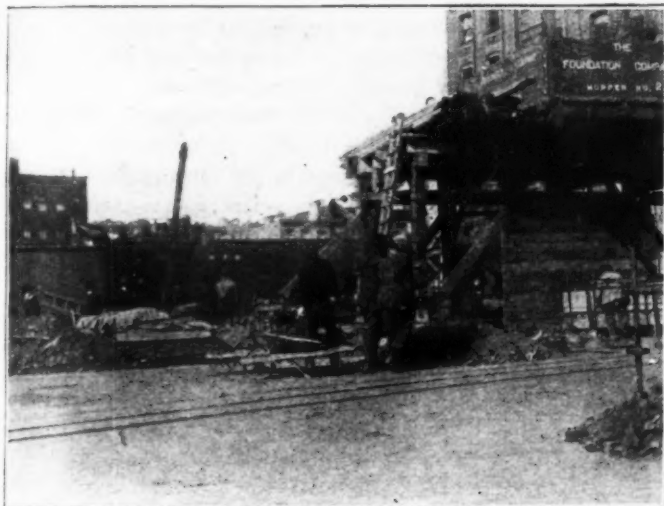
The spirit, the purpose of ALBERT CONSTRUCTION SERVICE are embodied in our book bearing this title. If you care to learn more about this service, write for this book.

A well-illustrated book or pamphlet always is attractive and much can be told in an impressive manner. Most of those who receive a copy will keep it and even years after it is published jobs will be procured by it. Naturally such books are expensive to publish.

As for the advertisement, it is well worded and as it tells a story of service and shows long experience, it is bound to get new business.

Some newspapers in many of our cities are now catering to contractors and construction engineers for advertisements. The space is small, barely sufficient for a publicity card, and appears once a week. This kind of advertising would amount to but little but for the fact that a page or more of reading matter accompanies the "ads." In this space the newspaper is glad to publish interviews with contractors or prepared statements as to labor conditions, the cost of building, the troubles of the contractor, and many other things regarding construction and building. This part gives publicity to the contractor.

These are some of the various means of advertising a contractor's business and today it is well understood that if a man is to increase the amount of his business steadily and quickly, he must do advertising according to modern methods and ideas.

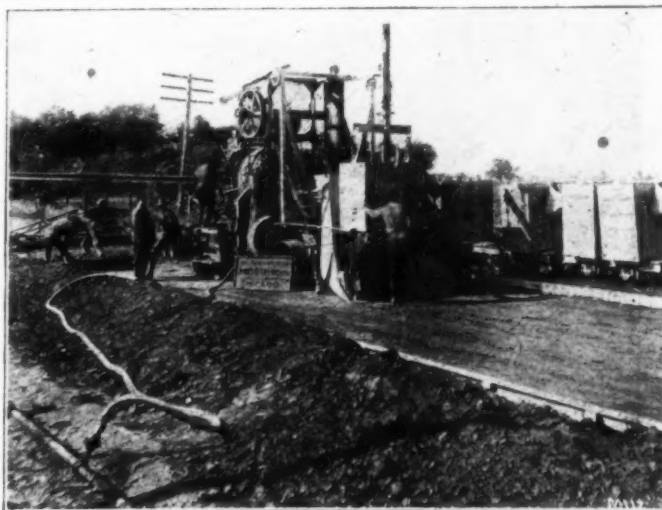


SIGN ON LOWER BROADWAY, NEW YORK, PASSED BY THOUSANDS DAILY.

the job. Road engineers and commissioners like to have copies for their offices and frequently will reproduce them in their annual reports. Then, too, engineering and trade papers are anxious to use photographs if they tell a real story.

Articles descriptive of jobs and published in the trade papers form another way of advertising a contractor's work. New or unusual methods or time-saving features are always of interest to engineers and editors, the latter generally publishing these articles and paying their usual rates for them. Advertising of this kind may mean little locally unless followed up, but it is national advertising. The way to take advantage of it locally is to send or take copies of the article to the local newspaper and in some cases they may be reproduced, either as a whole or in part.

A contractor's business can be advertised success-



A MOVABLE SIGN WHICH CAN BE PLACED IN MANY ADVANTAGEOUS POSITIONS.

MISSOURI ROAD MAKING

How A Contractor Minimized Effects of Labor and Material Shortage

BY CHARLES P. BURTON

THERE is no more interesting story of successful methods than the way Roy Williams of Wyatt, Mo., and his efficient superintendent, Everett Prosser, are handling a concrete road contract near Charleston, Mo. Mr. Williams is building 15.3 miles of concrete road there, 16 ft. wide—a two-course pavement. There is a foundation course of 1:3:5 concrete, topped with two inches of granite—a 1:2:3 mixture.

Experience and observation told the contractor that he would encounter a shortage of both labor and material. He, therefore, set himself to the task of minimizing the effects of both. His first step was to arrange for the installation of a batch-box direct-charging system, with industrial railway. He started early in the season to accumulate material in stock-piles,—sand, gravel and crushed granite. Opposite each pile he erected a small bin, which can be picked up bodily by the crane and placed on a standard flat car. Standard gauge tracks are so laid out that the crane can unload material cars into the bins or load from the stock-piles, as desired.

The industrial railway passes under the bins where the batch-boxes are loaded by gravity, and then goes directly through the cement house, on the way back to the mixer. Every fourth car carrying two batch-boxes is loaded with aggregates for the top course and marked with a tag. In the cement house the train stops by the side of a platform, from which bags of cement are unloaded into the batches, extra cement required for the top course being placed in the boxes with tags.

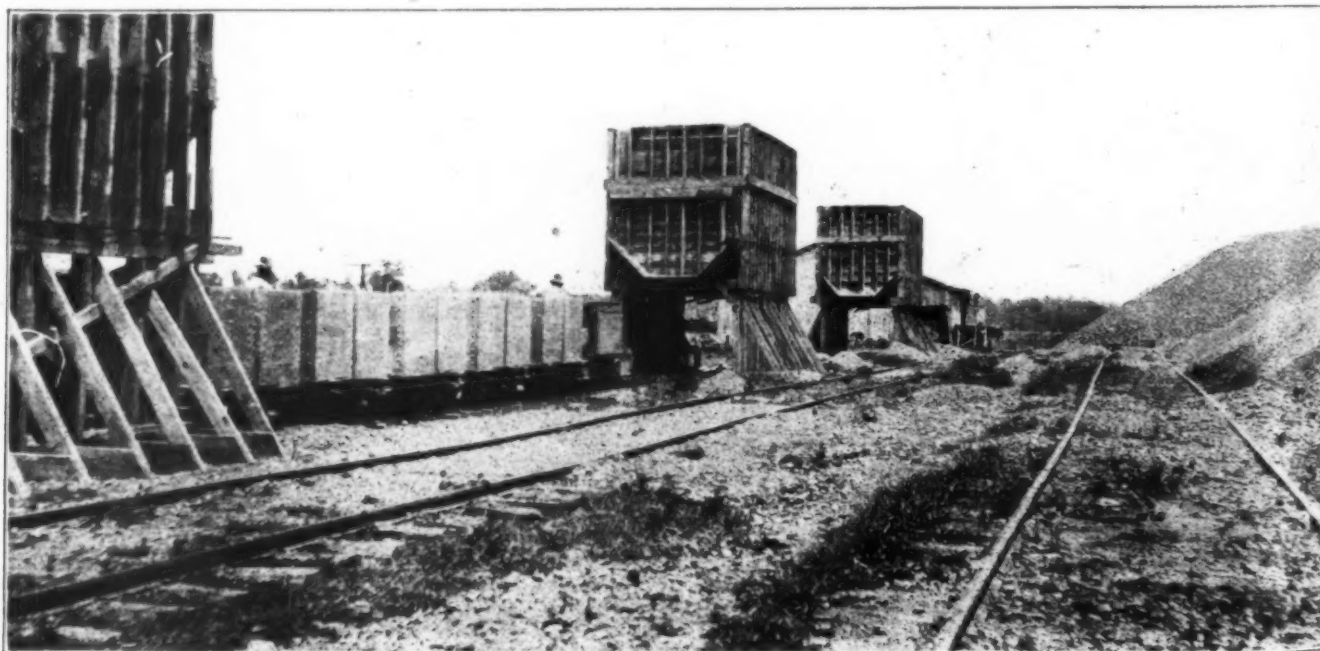
When the train reaches the mixer every fourth car, containing two batches, is loaded with top mixture. The

six batches on the first three trucks are transferred to the mixer by crane and the resulting concrete spread for the base; then the two batches of "top" on the fourth truck are spread over that.

The maximum number of men around the mixer has been, 1 foreman, 1 mixer engineer, 1 fireman (who also handles the small transfer crane), 3 men handling the boxes and spotting the cars, 3 spreaders, 1 finisher and a water-boy. The plant organization is, 1 crane operator, 2 men unloading aggregates, 2 men unloading cement. The crane operator does his own firing. The maximum day's run has been 503 feet in eight hours.

Contractors will note the possibilities of this arrangement for creating big storage piles, by starting early in the season, at little extra cost for rehandling, as the crane operator has to be on duty throughout the season anyhow. When out of material cars, Mr. Williams loads from his stock-piles; when cars are on hand, he unloads them into the bins direct.

This far-sighted contractor, realizing that transportation difficulties would doubtless delay the shipment of the carloads of cement needed for his job, determined to overcome this difficulty so far as keeping his men busy was concerned by building up a permanent organization which could be shifted to other work whenever the supply of cement gives out. With this in view, the grading, which is light, is not allowed to get far ahead of the paving. Then when the mixer is idle the crew is shifted to the grading and works at this job until a new supply of cement is received. This method has proved satisfactory and economical and the waits for cement shipments are hardly noticed.

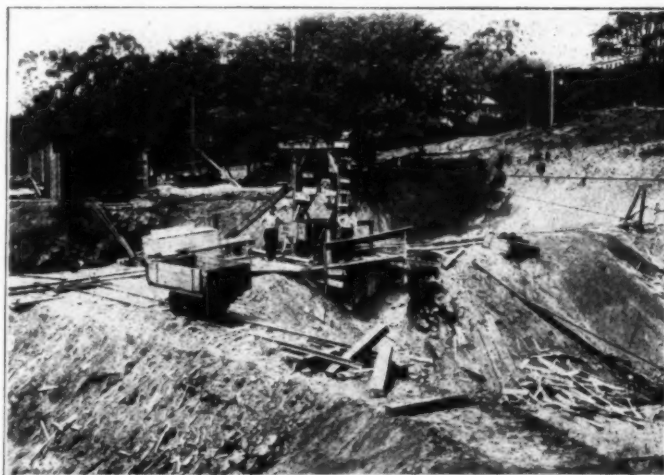


Small bins erected opposite each stock-pile. Batch-boxes passing under bins are loaded by gravity.

AUTOMATIC DEVICES SPEED TUNNEL WORK

SEVERAL automatic devices contributed to the efficiency and speed with which the work on the Twin Peaks Tunnel in San Francisco was carried on.

The elevators used for raising the muck cars from the tunnel were electrically operated and equipped with electric switches so that each car of muck elevated was automatically registered in the office of the superintendent of construction, who could tell the exact



ELEVATOR WITH CONTROLLING DEVICE

amount of the excavations without going to the tunnel.

These elevators also were equipped with an automatic elevator starting device which could be operated either from the tunnel level or the surface level, and when the elevator reached the top it stopped automatically just level with the rails onto which the muck cars were run to be hauled away. The cars stopped at the tunnel level automatically.

HOW ABOUT CONSTRUCTION PLANKS?

GENERAL R. C. MARSHALL, Jr., formerly Chief of the Construction Division of the Army, who lately accepted an appointment as General Manager of the Associated General Contractors of America, has addressed an open letter to the Chairmen of the Democratic and Republican National Campaign Committees asking them to make clear to the men directly interested in the construction industry as well as to all citizens just how they propose to realize the aims set forth in their respective platforms in regard to the construction of highways and the encouragement and development of water transportation and facilities.

Editor's Note: SUCCESSFUL METHODS thinks this a perfectly legitimate request.

FINES FOR OVERLOADED TRUCKS

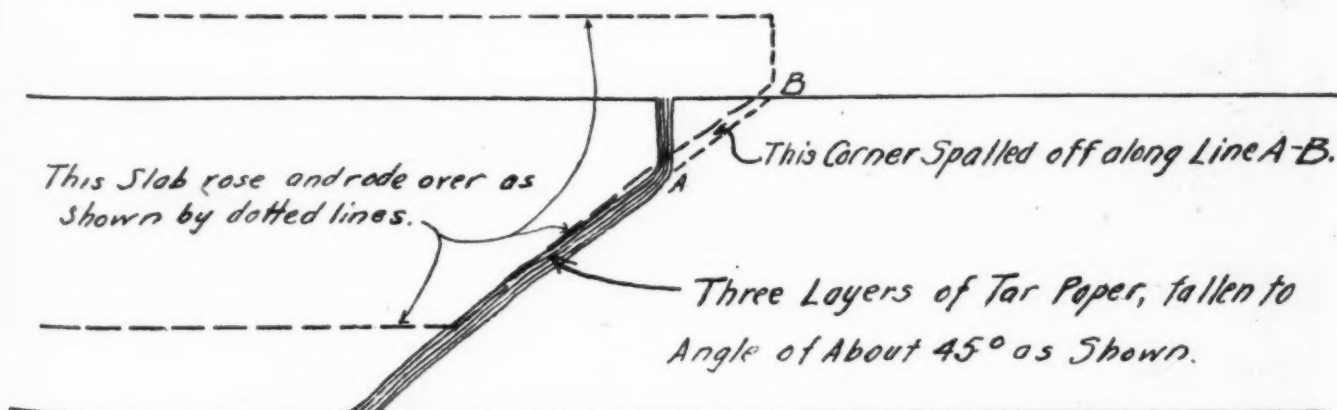
A PHASE of modern traffic operating against the maintenance of good roads in the various states is brought about by the overloaded truck. Since transportation needs have been so pressing, the truck has been used extensively to relieve freight congestion. There is a tendency, however, to overload these trucks, and the New Jersey Highway Commission has taken steps to remedy this condition in New Jersey. A fine will be imposed on all overloaded trucks passing through the state. Scales will be placed at various points on the highways, and trucks that appear to be overloaded will be weighed. If they carry more than the weight allowed by license, a fine will be imposed.

A FAULTY EXPANSION JOINT

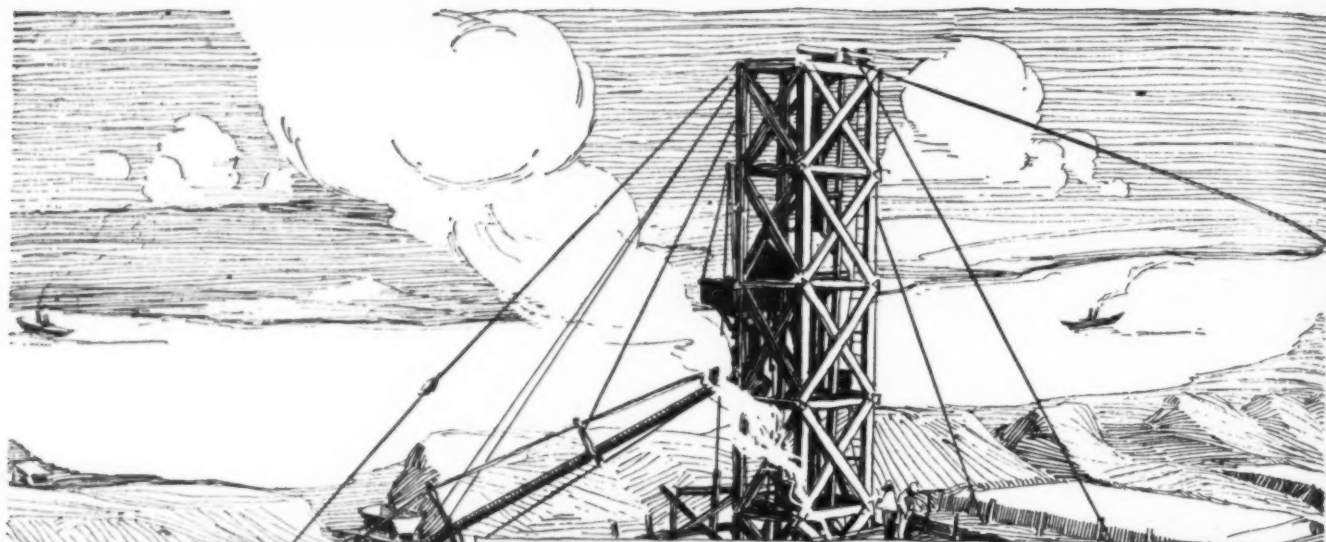
A RECENT occurrence on a Georgia road job shows the necessity of using the greatest possible care in the construction of expansion joints on concrete roads. On a stretch of concrete highway recently constructed in that state, one of the slabs of concrete was forced out of place during a spell of hot weather, and an examination made of it by the State Highway Department showed that the expansion joint was not only too narrow but that sufficient care had not been taken to make it vertical. As

a result, one of the slabs had risen a couple of inches and slipped over the end of the slab next to it, as shown in the diagram. It was necessary to reconstruct the entire joint and rearrange parts of both of the damaged slabs, at considerable expense.

One of the beneficial results of the mishap is that the Georgia Highway Department now specifies that all expansion joints must be an inch wide, poured and spaced every 100 feet.



LONGITUDINAL SECTION SHOWING HOW DISTORTION OCCURRED



THE EXPORT
BUSINESS OF
THE NON-COM-
PETING MAN-
UFACTURERS
WHOSE ADVER-
TISING APPEARS
IN THIS MAGA-
ZINE IS HANDLED
BY THE ALLIED
MACHINERY
COMPANY OF
AMERICA.

The World Wide Guide
to The
Best Construction Machinery
and Service

ALMACOA

Speeding the Building of the World

THIS is the function of the Allied Machinery Com-
pany of America—and it is organized to fill it.

So, wherever there is building activity—whether in an
old world capital, or a still older city of the Orient, or
yes, at civilization's very outposts—there you will find
the Almacoa men, machines and service.

Almacoa men are pioneers in standardizing the better
methods of construction work. They are *on duty*
where the work is being done—doing their bit to
“speed the building of the world.”

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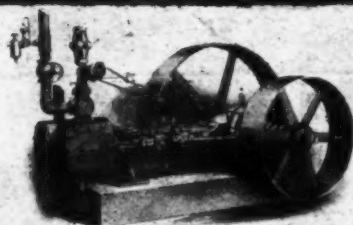
FARQUHAR



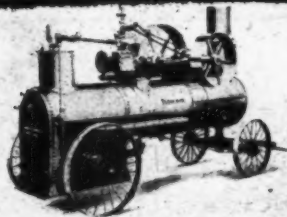
FARQUHAR Power Units are flexible. There are many combinations including tractions, locomotive, vertical and stationary. One of these will exactly suit your needs.

With Farquhar engines and boilers you can fit the machine to the job—not the job to the machine.

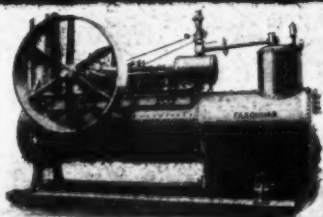
This flexibility is well worth your careful study. Farquhar catalogs tell more about it. Have you copies?



Ajax Center Crank Engine—Detached



Ajax Center Crank Engine on Locomotive Boiler on Wheels



Ajax Center Crank Engine on Locomotive Boiler on Sills

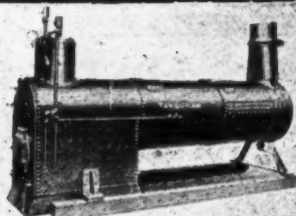
EVERY Farquhar machine has nearly 60 years of manufacturing experience behind it. All Farquhar Engines, Boilers and Tractors are made of the best materials from the most approved design and thoroughly tested.

You take no chances on Farquhar. Our trade mark and name is your guarantee.

Write for the
Farquhar
Catalogs



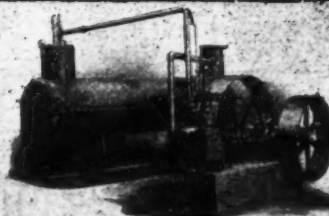
They are yours
for the
asking



Locomotive Boiler on Sills—Semi-Portable



Locomotive Boiler on Wheels—Portable



Detached Ajax Engine and Locomotive Boiler Piped Up

A. B. FARQUHAR & CO., Limited

Box 478

YORK, PA., U. S. A.

PARSONS

In Action Digging

Here you see the Parsons Excavator in action—but not in the war zone. Instead of being demons of destruction, the Parsons machines are implements of construction employed in the promotion of peace and prosperity.

This illustration from an unretouched snap-shot shows Parsons in action digging a *business* trench in the American Northwest.

There is an interesting story connected with this operation. Read it on the opposite page. The owners were so enthusiastic about the good work of the Parsons that they wrote us and told all about it. Naturally, this is another case where the buyer "stopped picking after picking a Parsons."



Read the facts as related by those on the job.

Then take up with us the matter of getting Parsons equipment to do *your* trenching. There is a Parsons machine to fit your job.



The Parsons Company

NEWTON, IOWA, U.S.A.

NEW YORK, 145 CENTRE ST.
EASTERN DISTRICT BRANCH

LOUISVILLE
MILWAUKEE
DENVER

HOUSTON
SALT LAKE CITY
SAN FRANCISCO

LOS ANGELES
PORTLAND
WINNIPEG

CHICAGO, 1180 LA SALLE ST.
CENTRAL DISTRICT BRANCH

TORONTO
OTTAWA
MONTREAL

EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA
17 Columbia St. New York, U.S.A. Canada Branch New York

Beg Your Pardon—Our August advertisement stated that bearing pressure of the Parco Traction is 28.6 pounds per square foot. This was an error. It should have read "Bearing area is 28.6 square feet."

PARSONS

Business Trenches

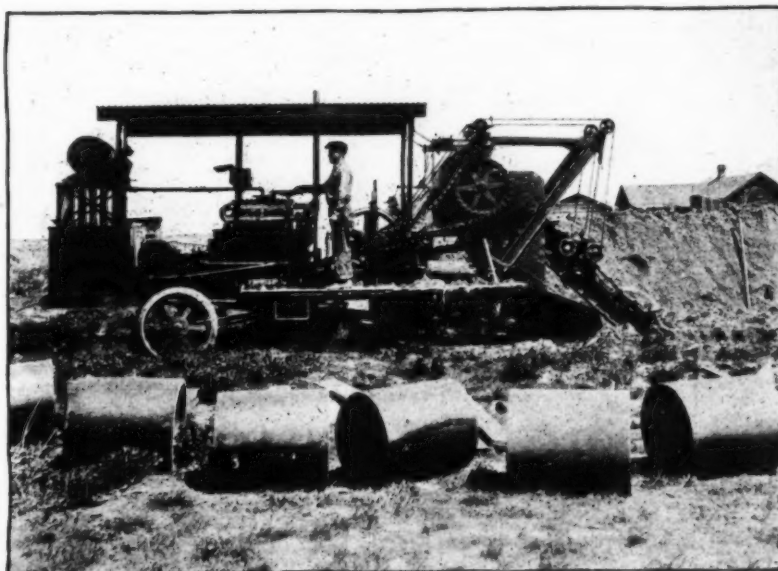
Where the Parsons is shown in actual operation observe that the men are busily engaged in spudding down the sides of the trench, throwing the earth into the buckets for elevation. We are told that this was very nasty material to handle—it was loose gravel with a little sand mixed in.

Soon after starting the job—after about six feet of trench had been dug—the sides caved in. Gravel and sand ran from a distance of 18 feet from the side of the trench, filling it as completely as a Backfiller would have done.

Now—here's the big point: In operating under such conditions the boom will be buried entirely. If the machine is not completely reversible, strongly built and easy to manipulate, there is great danger of tearing something loose or seriously damaging the working parts. But with the Parsons it was possible, by manipulating the driving mechanism, to shake the boom loose and get it out without damage, with no great loss of time and without recourse to hand labor.

Further to get the boom free it was necessary to raise and lower it.

As the boom hoisting cables are operated thru a positive locking mechanism, the boom could be held in any position even though heavily loaded with earth.



The Parsons Company

NEWTON, IOWA, U.S.A.

NEW YORK, 145 CENTRE ST.
EASTERN DISTRICT BRANCH

LOUISVILLE
MILWAUKEE
DENVER

HOUSTON
SALT LAKE CITY
SAN FRANCISCO

LOS ANGELES
PORTLAND
WINNIPEG

TORONTO
OTTAWA
MONTREAL

CHICAGO, 11 SO. LA SALLE ST.
CENTRAL DISTRICT BRANCH

ALMACON EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA
51 Broadway, N.Y. City, U.S.A. Canada Branches New York



Western Dump Co-

ONE large contractor claims that when it comes to a "narrow-gauge job," "there ain't any such animal." He prefers standard gauge equipment every time, and **Western Dump Cars always.**

Most contractors will agree as to the *make* of car, although they may differ as to size.

It takes a *real* car to stand up, month after month, on the hardest kind of service—and your dump cars are the determining factor in the yardage handled. With a steam shovel's time worth at least a dollar a minute, dump cars must be kept moving with no loss for needless breakdowns or repairs.



Western Wheeled Sper

Earth and Storing Equ

ALMACON

ALLIED

OF AMERICA



Co-Built for Service

THE improved Western Air Dump Cars will **outwork** and **outlast** any other make of dump car on the market. That means Western Cars will make more money for the contractor—will handle material more economically for the industrial plant.

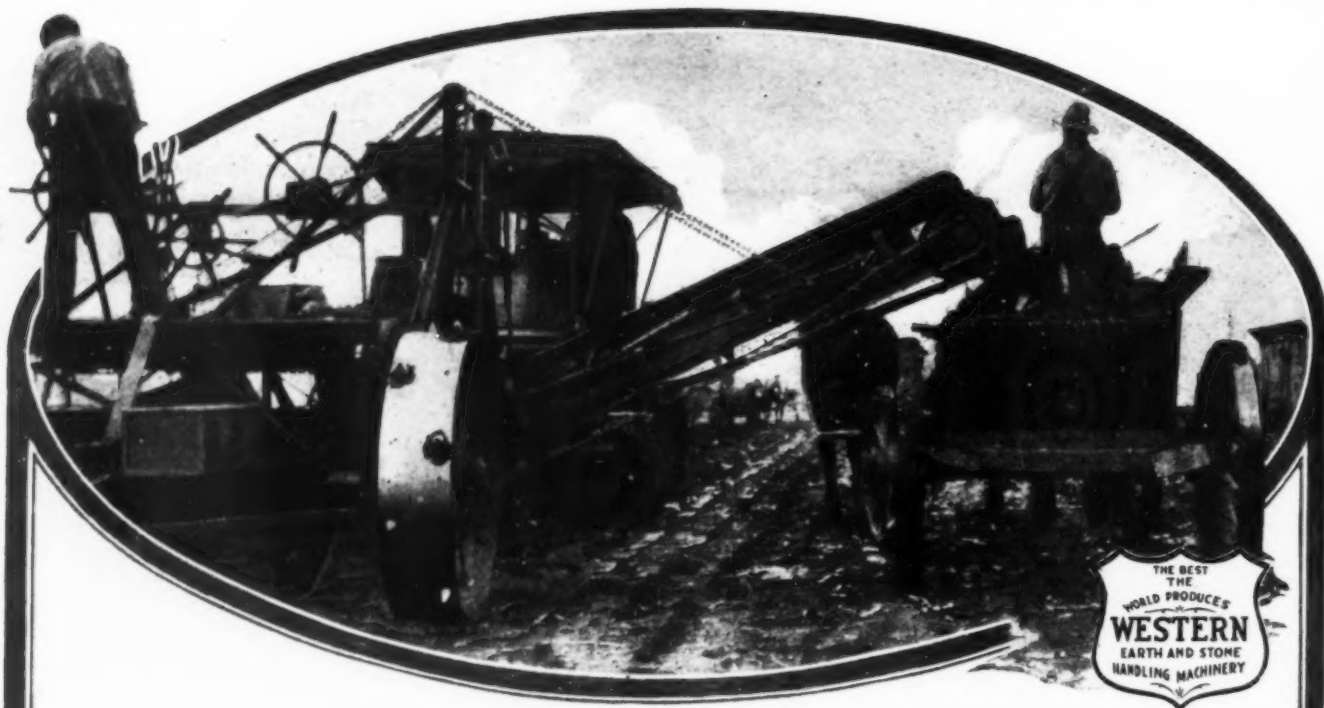
Consuming the same or less amount of air, Western Air Dump Cars have 34 per cent greater dumping power than any other air dump car made.

Dumping speed, strength, dependability, scientific design, steep dumping angle, large discharge opening, freedom from derailment—these are features of superiority which characterize Western equipment. Our Engineering department is at your service. Send for our new Dump Car Catalog, S-51.

Sper Company AURORA
ILLINOIS, U. S. A.
Storage Equipment



Western Machines. Have Greater Capacity



OCCASIONALLY someone unthinkingly says that the Western Elevating Grader takes more power than a machine of some other make.

It doesn't, unless you make it do more work than the other machine.

Undoubtedly it takes more power to plow a furrow 12 in. deep than one 8 in. deep.

It takes more power to load a cubic yard of dirt in a given time than it does to load two-

thirds of a yard — BUT the additional yardage, gained by putting on more power, will be the cheapest dirt you ever moved.

Buy a Western and then use power enough to work it to capacity. That's the way to make money in dirt moving.

*Send for our new catalog, S-46
if you haven't one already.*

Western Wheeled Scraper Company
Earth and Stone Moving Machinery

AURORA, ILLINOIS, U. S. A.

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AS PIONEERS in the manufacture of Portable Saw Rigs, we are entitled to claim that we manufacture the best on the market today.

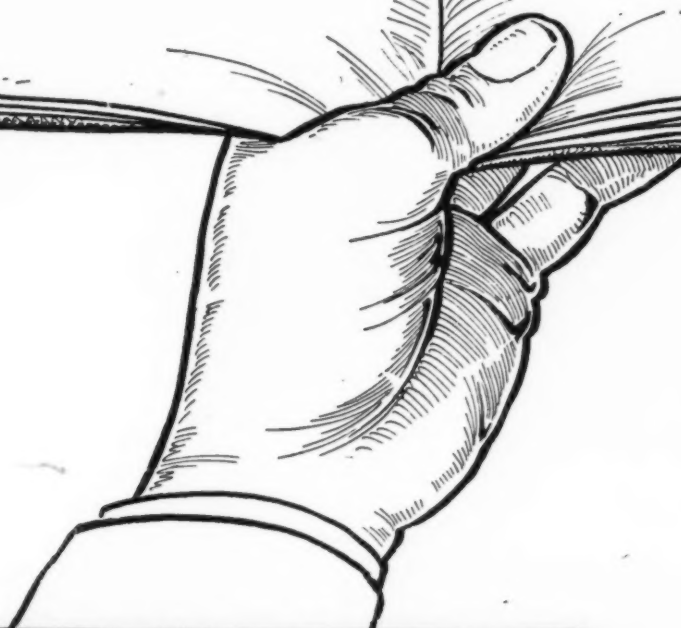
OUR NEW complete catalog, descriptive of our line of Power Driven Saw Rigs, Bilge, Centrifugal, Piston and Triplex Pumps, Builders Hoists, Elevators, Mortar Mixers, Engines, now ready for you.

C. H. & E. MANUFACTURING CO. INC.

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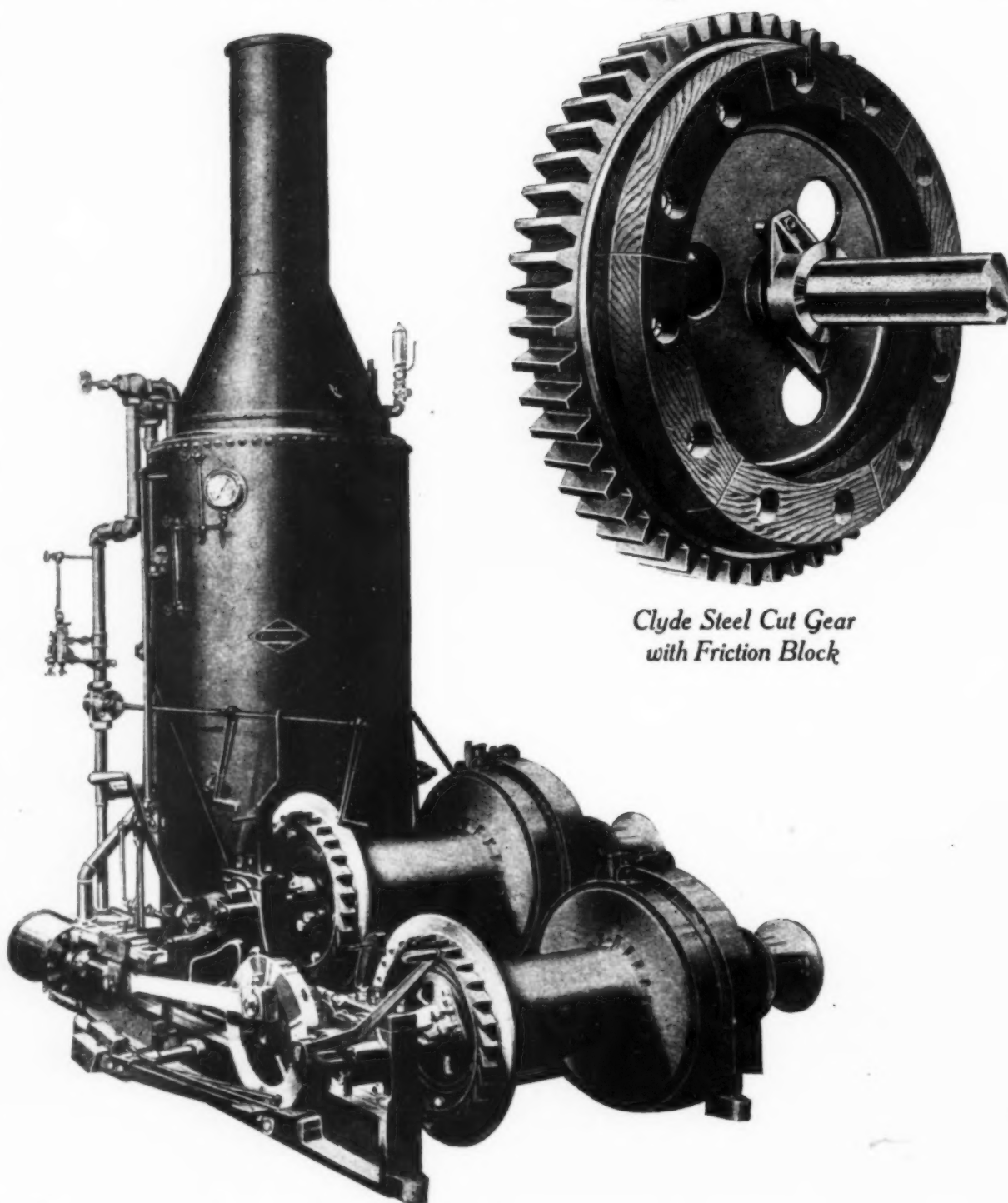
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What the Clyde Cut



*Clyde Steel Cut Gear
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Hoist with Boiler*



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Gears Mean to You

CLYDE Equipment has machine cut gears throughout. By modern manufacturing methods and large volume production this correct construction is offered you at practically no greater cost.

Machine cut gears mean longer life, smoother running, lower upkeep, less power consumption, and greater service — facts of vital interest to you.

Machine cut gears is just one of the reasons why contractors all

over the world are *standardizing* on Clyde. Are you getting the advantages gained by using Clyde Equipment?

7x10 and larger hoists are made with steel gears.

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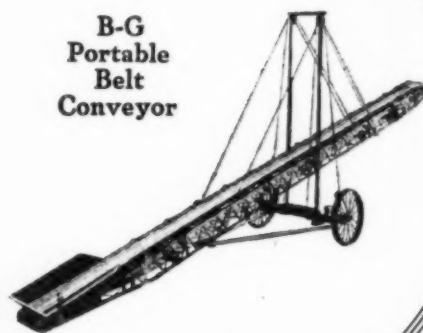
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**B-G
Self-Feeding
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Machines for loading
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Machines for loading
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Should Keep Cars Rolling



STANDARDIZED
MATERIAL-HANDLING
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Reasons:

1. *To help all business.* A recent survey of the railroad situation shows that the normal breakage and wreckage of cars on most lines is higher than the present rate of building new cars. Prominent railroad men estimate that it will be at least three years before the crisis is passed. There is only one remedy. That remedy is to keep every available car rolling the maximum time. Prompt unloading and loading is a national economic necessity—a vital factor in stabilizing business and decreasing high costs.
2. *To help your business.* The scarcity of cars is affecting **your** business, increasing **your** costs and decreasing **your** production. Delays in loading and unloading, the use of cars for storage—all needless delays are worse than expensive—they are almost criminal. And railroads are now giving preference to shippers and receivers who promptly release their cars. Are you helping **yourself**? Have you investigated machine methods? Do you know that B-G Loaders and Conveyors offer the **immediate** solution of part of this car problem?

Write for catalog R and full particulars.

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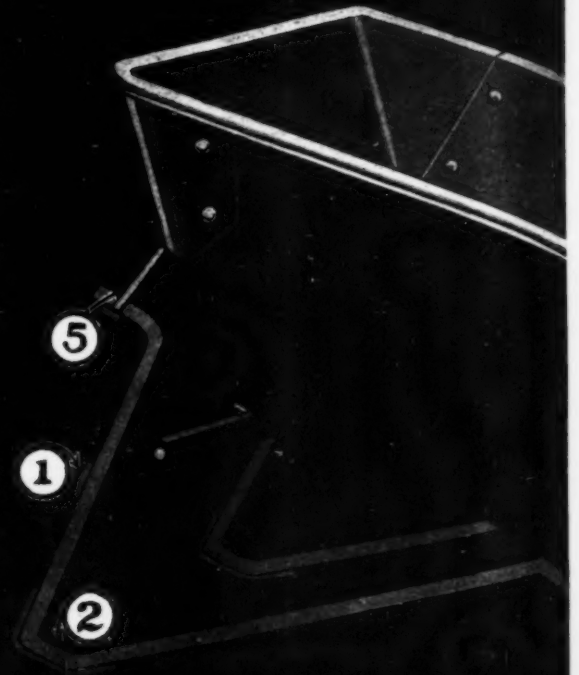
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STERLING ON A WHEELBARROW MEANS



Sterling Wheelbarrow Company

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St. Louis, Mo. New York, U.S.A. Chicago, Ill. New York

Six Points Which Make the Sterling Better

Sterling Wheelbarrows are so different that it is easy to know them at a glance by these six points which make work easier and cut upkeep costs to the bone:

1. Rivets vs. Stove Bolts—

Sterling riveted leg construction cannot work loose. Stove bolts on ordinary wheelbarrows constant source of trouble.

2. Broad Flat Leg Bearing With Extra Steel Shoe—

Heavy channel iron construction. Last indefinitely. Never wears through as do usual pointed legs.

3. Just a Cotter Pin, But—

It locks the axle so it can't turn the hub. No nuts or bolts to work loose, nor to hinder the wheel. Think this little cotter pin over.

4. Two Extra Spokes—

The only wheelbarrow wheel with ten spokes—others do with eight. The extra two double tire strength, and eliminate flattened and broken tires.

5. Handles Clamped On—

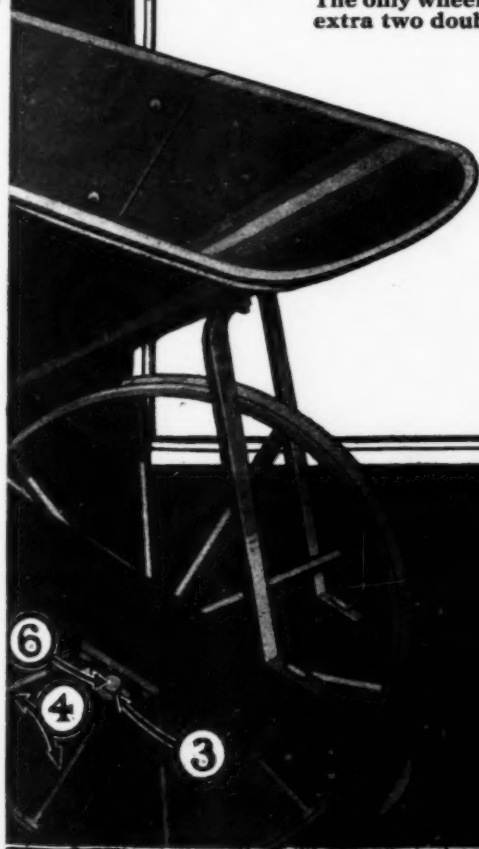
No bolt holes in the handles to weaken them. Here's added strength at the point of greatest strain. Sterling construction again.

6. Self-lubricating Bearings Never Wear—

No oilings—no squeaks—no worn out bearings. Sterling bearings outlast the wheelbarrow, or we replace them free. This self-lubricating feature reduces wheeling effort 50%.

"Ask the man who pushes one"

or write to us
for catalog and full particulars



Sterling Wheelbarrow Company

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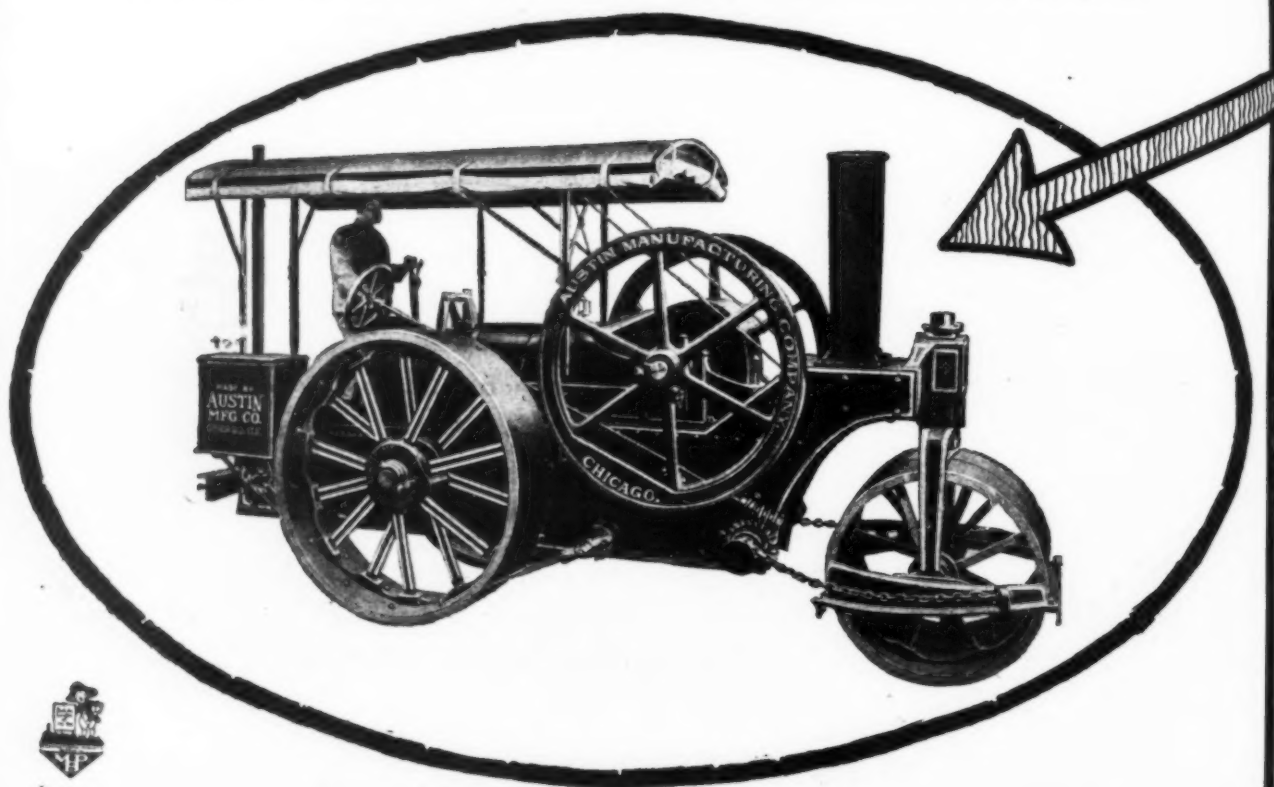
Why Contractors Choose

THERE are reasons for Austin Roller popularity with road contractors, state, county and municipal officials. These men know values, know what to expect from their machines—and Austin Rollers "fill the bill."

For 13 years Austin has been manufacturing Road Rollers and the original policy of building only the *best* has never been altered. Today, Austin is the largest manufacturer of Rollers in the country—proof that users of Rollers demand and appreciate *quality*.

The line is complete. Rollers for every job: Steam Rollers; Tandem Motor Rollers; Three Wheeled Motor Rollers, in 5 sizes—but each "The Leader of its Line."

During the war the United States and Allied Governments purchased over 700 Austin Motor Rollers, more than ten times their combined purchases of all other rollers and at higher prices.



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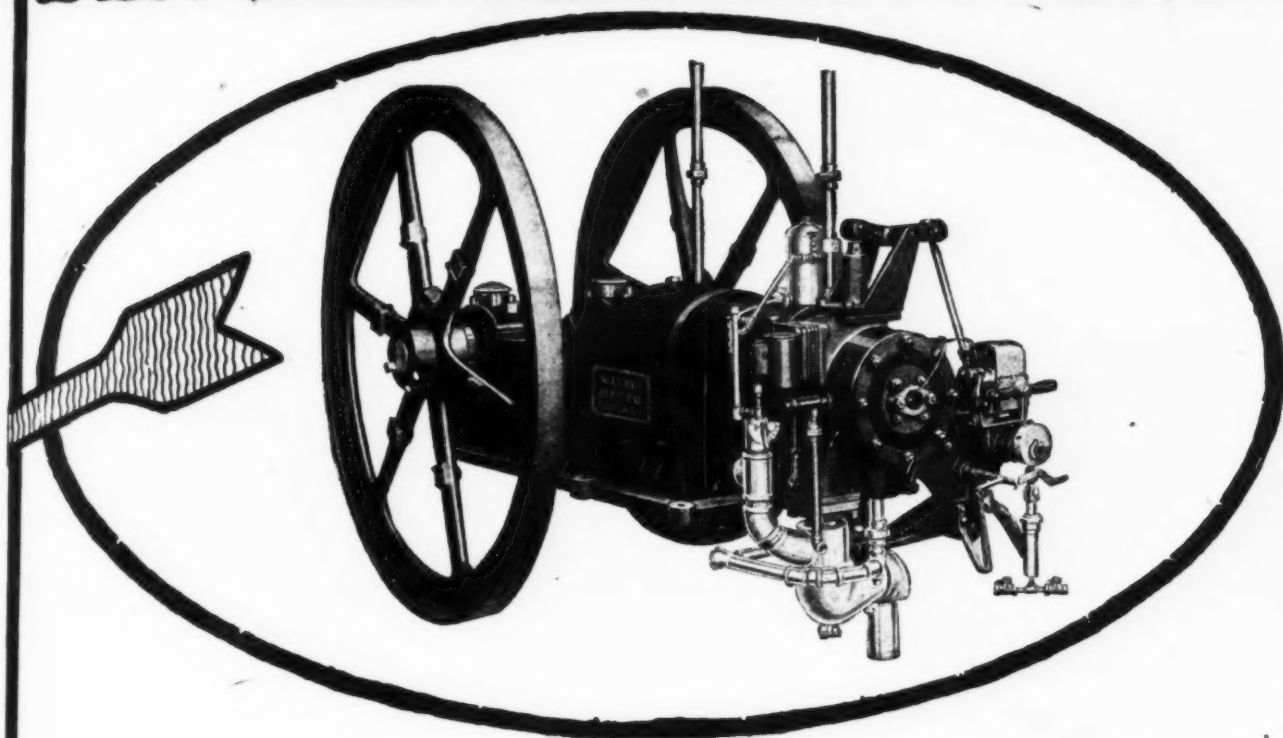
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The Austin Motor Roller



Austin Kerosene Motor

AUSTIN Motor Rollers are noted for their power. Here's the reason—the Austin single cylinder engine—used on the Three Wheelled Motor Rollers. Operates on either gasoline or kerosene.

A four-cycle horizontal type engine—strong, simple, dependable and powerful—vital factors in an engine working out on the road under rough conditions.

Fully protected by a sheet iron, removable hood so that dust and dirt can not get into the working parts. Equipped with an efficient, fool-proof self starter.

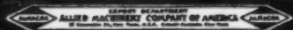
All through its design and construction this engine has been built for service. Its many unusual and distinctive features are explained in the Austin catalogs. Have you copies?

Plan now on your next year's needs and let us work with you. It costs you no more and guarantees deliveries when you want them.



ROAD MACHINERY CO. ILLINOIS

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DUMP WAGONS
STREET SPRINKLERS
STREET SWEEPERS
MOTOR SWEEPERS
ROAD PLOWS
WHEELED SCRAPERS
DRAG SCRAPERS

Roadbuilding in 1921

Your Plans—

Already 1921 gives promise of being a busy year for road builders. The shortage of labor, material and machines during the season now closing has left much work unfinished and there will be countless new jobs started.

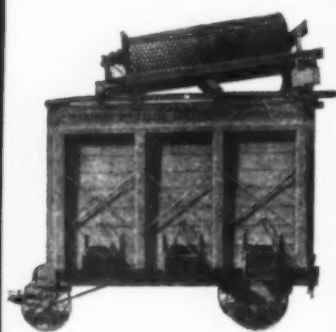
You contractors, state, county and municipal officials must make your plans early for the new year.

If the transportation situation does not improve in 1921, shipments will be still further delayed. The material situation still will be acute—you must place your orders early to insure deliveries when you need them.

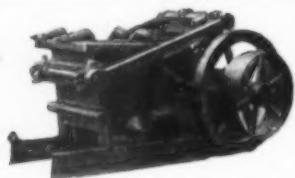
And the same with machinery—placing your orders early costs you no more—it helps you and it helps us. Let's get together now!



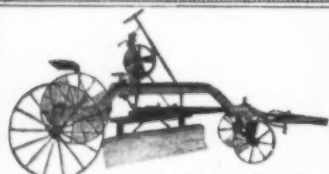
Catalog No. 20 covering the entire Austin-Western Line is now ready. Write for your copy.



Western Portable Bin



Aurora Two Blow Stroke Crusher



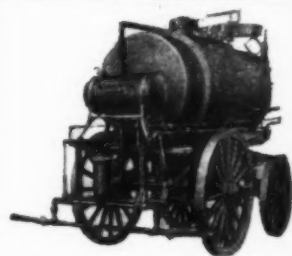
Western Midget Grader—Weight 1,000 Pounds



Austin Gyratory Crusher



Austin Steerable Scarifier



Austin Road Oiler with Heater Attachment

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Your Plans and Ours

Our Plans—

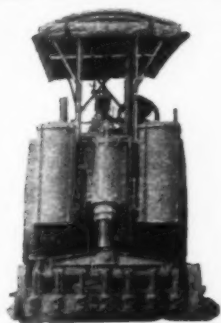
The purchasing of Road Machinery for 1920 is practically over and we are making our plans for next year. Austin-Western will continue to manufacture their complete line—machines for every step in the building of a road, from crushing the rock to sprinkling, oiling and sweeping the finished job. The same high quality will be maintained.

But with the scarcity of raw materials and the difficulties in transportation, manufacturing presents many serious problems, and we don't want you to be disappointed on delivery next year.

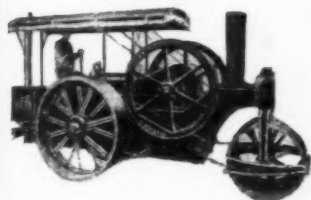
If you will work with us, tell us what will be needed, we will have your machines ready and *on time*. This co-operation costs neither of us more and it helps us both. Let's get together now!



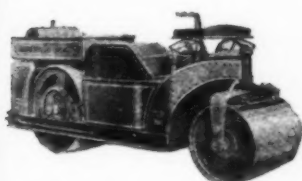
Catalog No. 20 covering the entire Austin-Western Line is now ready. Write for your copy.



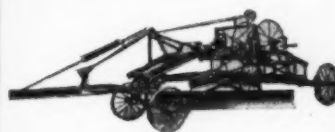
Austin Attached Scarifier



Austin Motor Roller



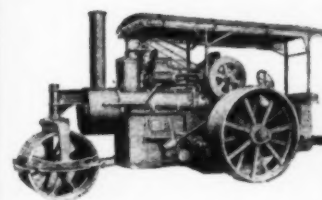
Austin Tandem Roller



Western No. 20 Reversible Road Machine—Weight 9,000 Pounds



Austin Rip Snorter



Austin Steam Roller

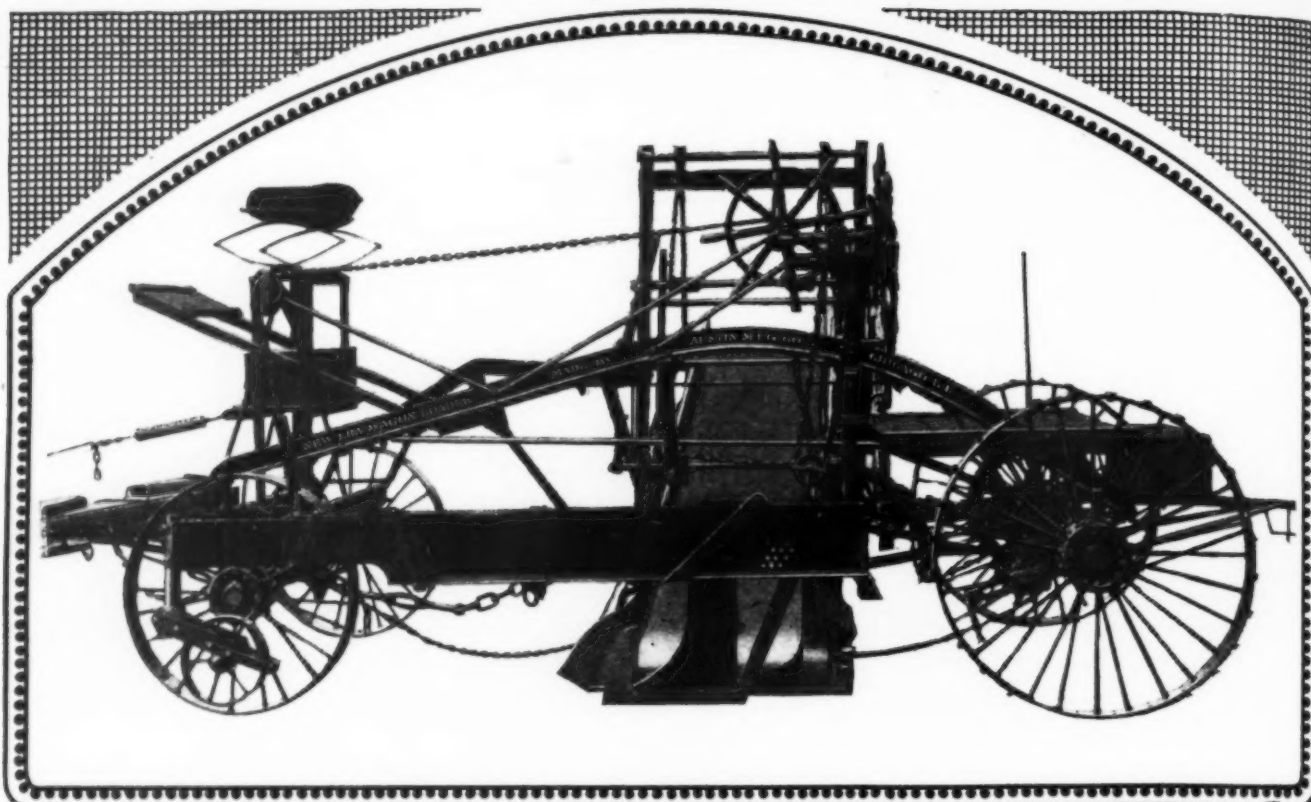
ROAD MACHINERY CO. ILLINOIS

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Makers of:

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DRAG SCRAPER



Austin New Era Elevating Grader

As one contractor said, "Just furnish the power and the New Era Elevating Grader *will move the dirt.*"

1000 cubic yards, loading five to six hundred yard-and-one-half wagons, is only one day's work for this machine. And the New Era will cut your costs in half, as compared with wheelers, scrapers or plows.

Speed and economy—these are the two big factors in grading jobs. The Austin New Era Elevating Grader is fast—it is economical.

Thousands of miles of roads have been built—hundreds of contractors are "boosters." Do you need more proof of what the New Era Elevating Grader can do?

Write for Catalog and Full Particulars

AUSTIN MANUFACTURING COMPANY

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Canadian Agents: Mussels, Limited, Montreal, Toronto, Winnipeg, Vancouver

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A road built by a New Era Grader is properly graded and has excellent ditches.



The Next President of the United States

must be a man who realizes our
Transportation Necessities

First - Railway Requirements

Second - Building of Highways

Third - Waterway Usefulness

*with apologies to
The Autocar Company*

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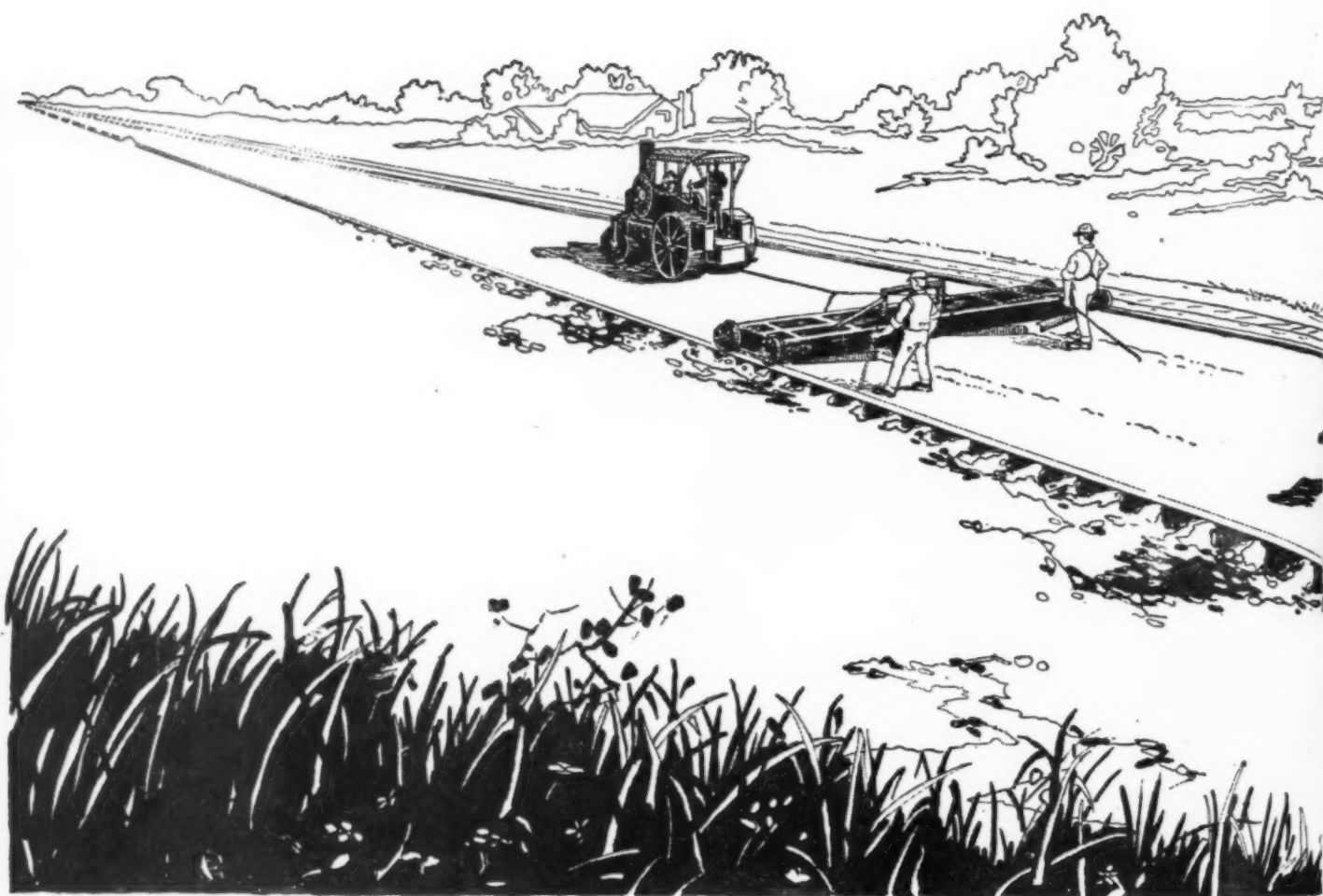
Lakewood

**Industrial Haulage
Construction Plant
Road Plant**

THE LAKWOOD ENGINEERING COMPANY, CLEVELAND, U.S.A.

Solving the Contractor's How the Lakewood Way

A LAKEWOOD ROAD PLANT is the result of a carefully thought-out plan. It is a group of standardized machines constructed to *work together* to produce maximum results with fewest men. It manufactures roads with the same certainty of speed and cost as a textile mill manufactures fabric.



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THE LAKEWOOD ENGINEERING

Credit Problem

Makes It Easier to Finance Road Jobs

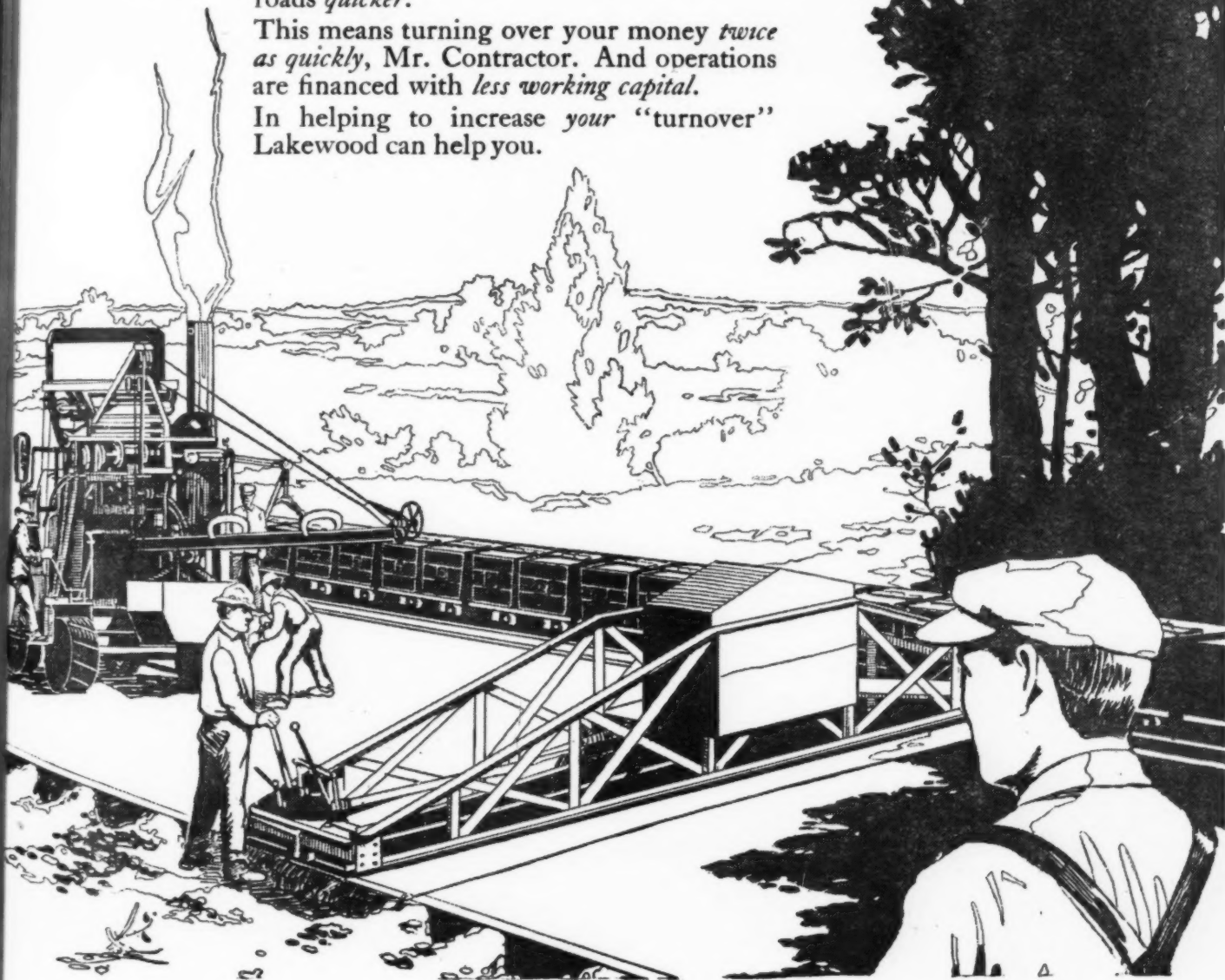
THE success of a manufacturer depends on his annual "turnover"—on the volume of business going through his plant each year.

The success of a contractor depends to a certain extent on his annual "turnover"—on the volume of road that he builds each year.

To double or triple his "turnover" the contractor must build roads *quicker*.

This means turning over your money *twice as quickly*, Mr. Contractor. And operations are financed with *less working capital*.

In helping to increase your "turnover" Lakewood can help you.



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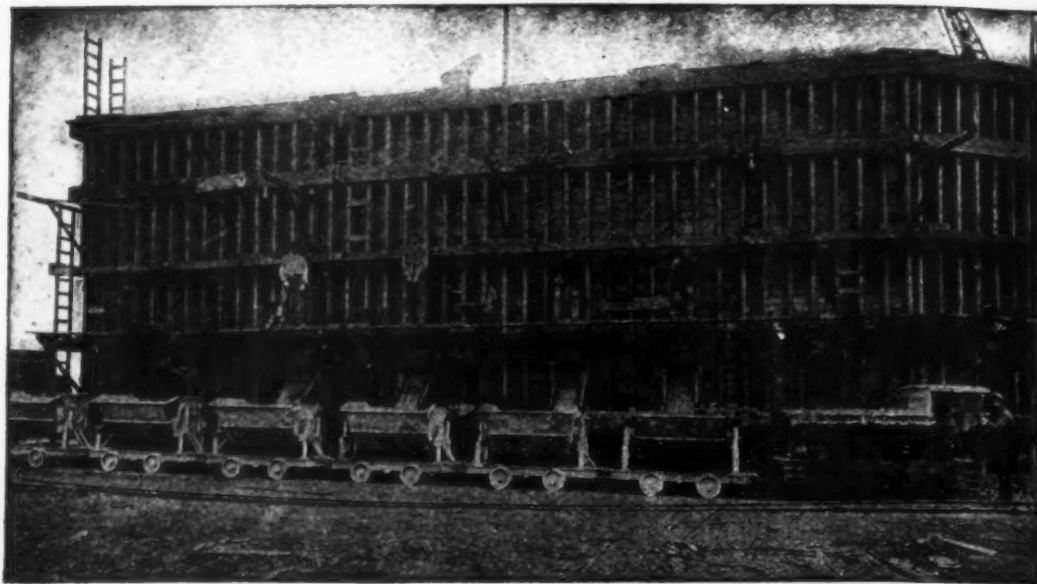
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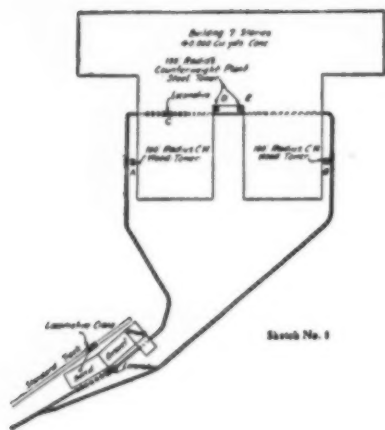
Industrial Haulage Road Plant Construction Plant

COMPANY, CLEVELAND, U. S. A.





View showing method of handling aggregates to cars: 6-car train of Lakewood No. 241 V-Dump Cars being loaded with sand. Lakewood Bin Gates used.



Westlake Construction Co. Locomotives and Cars Haul

LOCOMOTIVES and cars for delivering batches to the mixing plant were successfully used by the Westlake Construction Co. on a 7-story building for the United Drug Co. in St. Louis.

Four towers, each 150 feet high, were constructed on this work. Two towers were of wood, with 100 ft. boom plants on them. Two were of steel, with 100 ft. counterweight plants; at the base of each tower there was a 21-S ($\frac{3}{4}$ yd.) mixer.

The most interesting and unusual part of this job was the material handling. This was accomplished with two 3-ton locomotives, eighteen Lakewood $1\frac{1}{2}$ yd. V-dump cars and Lakewood bolted track. Bins were provided with a capacity of approximately 500 yds. of gravel and 300 yds. of sand. The cement shed adjacent to the bins was built with a capacity of four cars.

The material was delivered in cars on a siding and handled to the bins by a locomotive crane and clam-shell bucket. The V-dump cars were loaded at one side of the bin by a combination



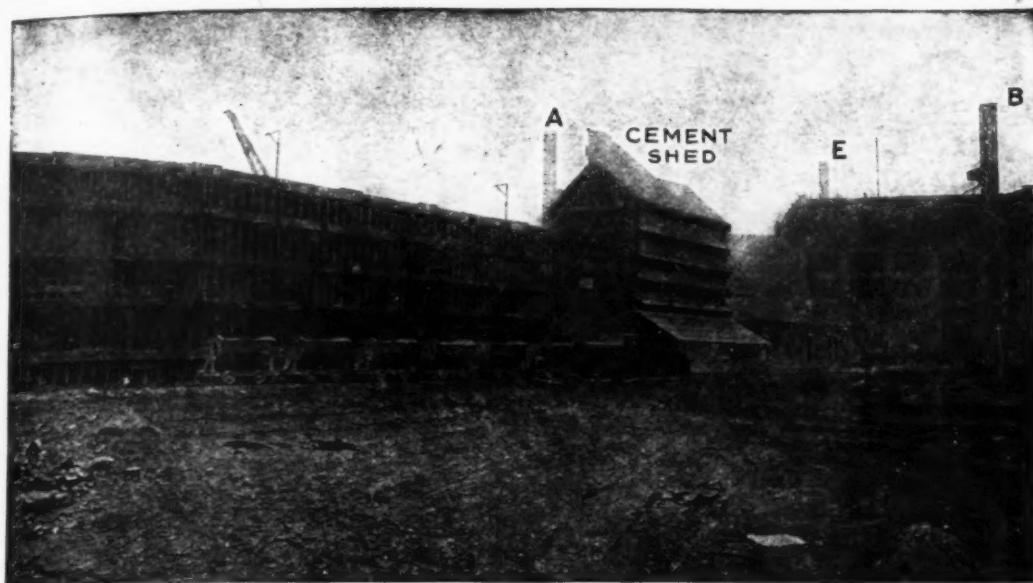
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Lakewood

THE LAKEWOOD ENGINEERING



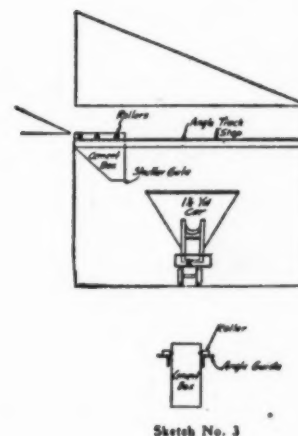
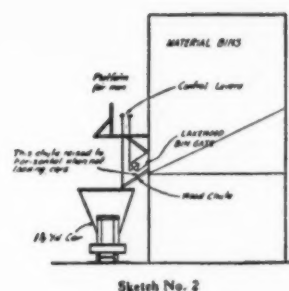
View showing sand, gravel and cement bins. The view also shows the location of these bins in relation to the building being constructed.

Speeds Big St. Louis Job Batches to Mixing Point

of Lakewood bin gates and wood chutes as shown in sketch No. 2. Six bin gates were provided for the sand and six for the gravel. These were so spaced that only one spotting was required for sand and gravel when handling a six car train. Sketches Nos. 2 and 3 show clearly the method of loading the cars.

After the cars were loaded with sand and gravel they pulled up to the cement shed. Here there were three cement measuring hoppers, each holding exactly the amount required for the batch. As there were only three hoppers, each six-car train had to be spotted twice for cement. Trains were loaded every five minutes.

The operation was so arranged that two of the mixers worked at once; thus with six-car trains, eighteen cars were required. The mixers were so placed that the V-dump cars could be dumped directly into the batch hoppers. Each mixing plant had three men so that, including the engineer and brakeman of each train, only twelve men were required for the two mixing plant operations.



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**Industrial Haulage
Road Plant
Construction Plant**

COMPANY, CLEVELAND, U. S. A.

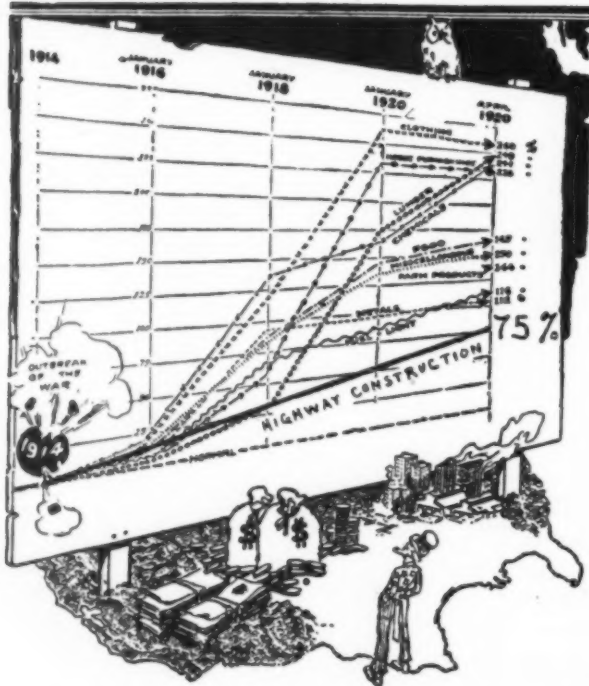


The Price and Value of Good Roads

THE *value* of anything is measured by its usefulness. The justifiable *price* of "anything" is determined by its value.

Prices mean nothing until considered in relation to *values*.

Prices to-day are high compared with costs of five years ago—from two to ten times as high.



As a matter of fact the increase in cost of highway construction is proportionally *less* than the increase in costs of other things. The illustration is from the June 19th issue of Western Highway Builder.

If *values* have increased in proportion, present day prices are fully justified.

A thousand bushels of wheat, or an equivalent measure of anything else, can be sold for dollars that will to-day buy just as much road as five years ago. Therefore the present *prices* of roads are not high.

In fact, we *need roads more to-day*. Their *value* to us is greater. Therefore the present day *prices* of roads are comparatively low.



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Lakewood

Industrial Haulage Construction Plant Road Plant

THE LAKEWOOD ENGINEERING COMPANY CLEVELAND, U.S.A.

OUR Daily Mail is a joy. It is not a sordid collection of envelopes to be opened by office boys and secretaries and put into wire baskets, some for Mr. Brown, some for Mr. Smith, and some for Mr. Jones. We hope we never get too old or too big or too rich to be "in" at the opening of the mail.

THE correspondence, of course, sharply reflects the success of our product, and there is always an urge to get down earlier in the morning than usual and read while fresh what the contractors and the miners and the railroad men and all of our Red Edge friends have to say—whether an order, a check, an inquiry, or a brow-beating for slow delivery.

SOMETIMES, and often, gems of many carats present themselves. For instance, last Monday we received a letter from New Castle, Pa.—a limestone concern—that was a full and complete Red Edge shovel advertisement. It read like this:

"WE have been having trouble getting shovels that will stand up. Recently a man was employed who came from a similar operation and he insisted on using a shovel that he brought with him. He is a good workman and his shovel has already outworn ours. Inspection shows it is one of your Red Edge No. 5.

"PLEASE give us prices and delivery on five dozen No. 5."

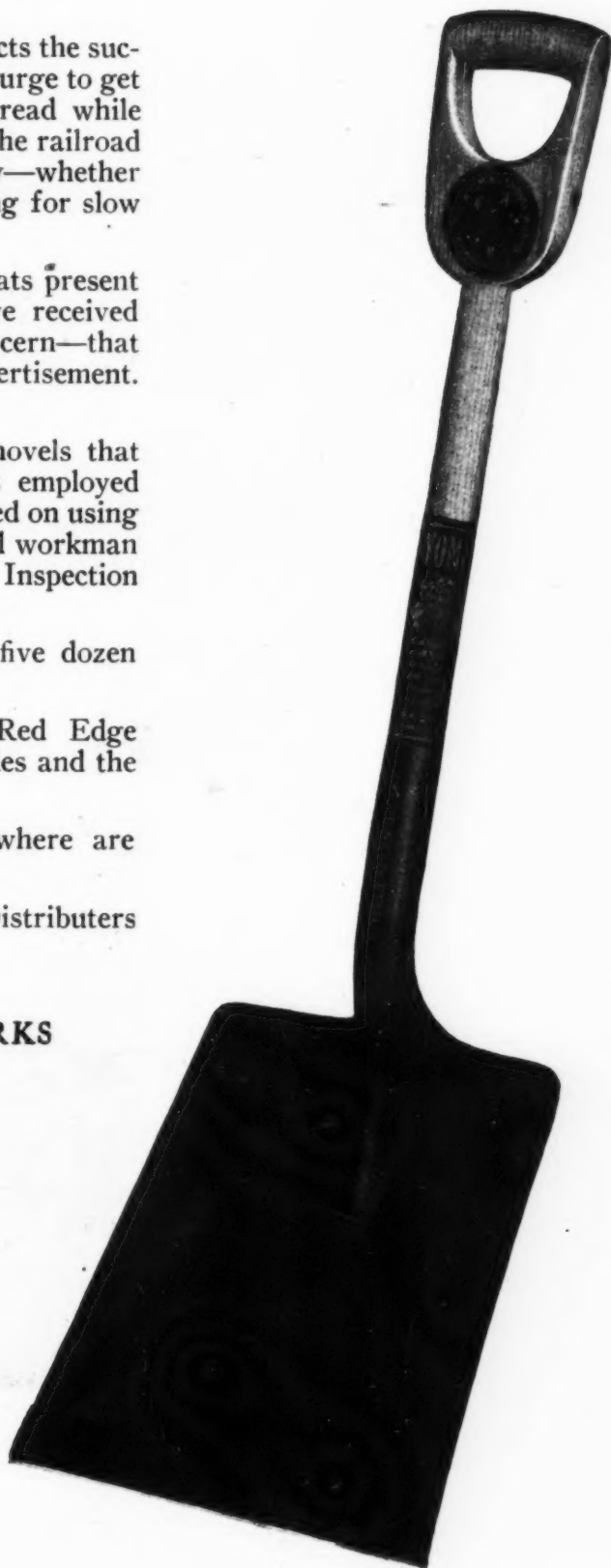
WE couldn't put the case any better. Red Edge shovels stand up and keep full sized blades and the shovelers like to use them.

NO wonder employers of shovelers everywhere are coming a'running for Red Edge.

IF you have a shovel trouble, tell it to us. Distributers everywhere.

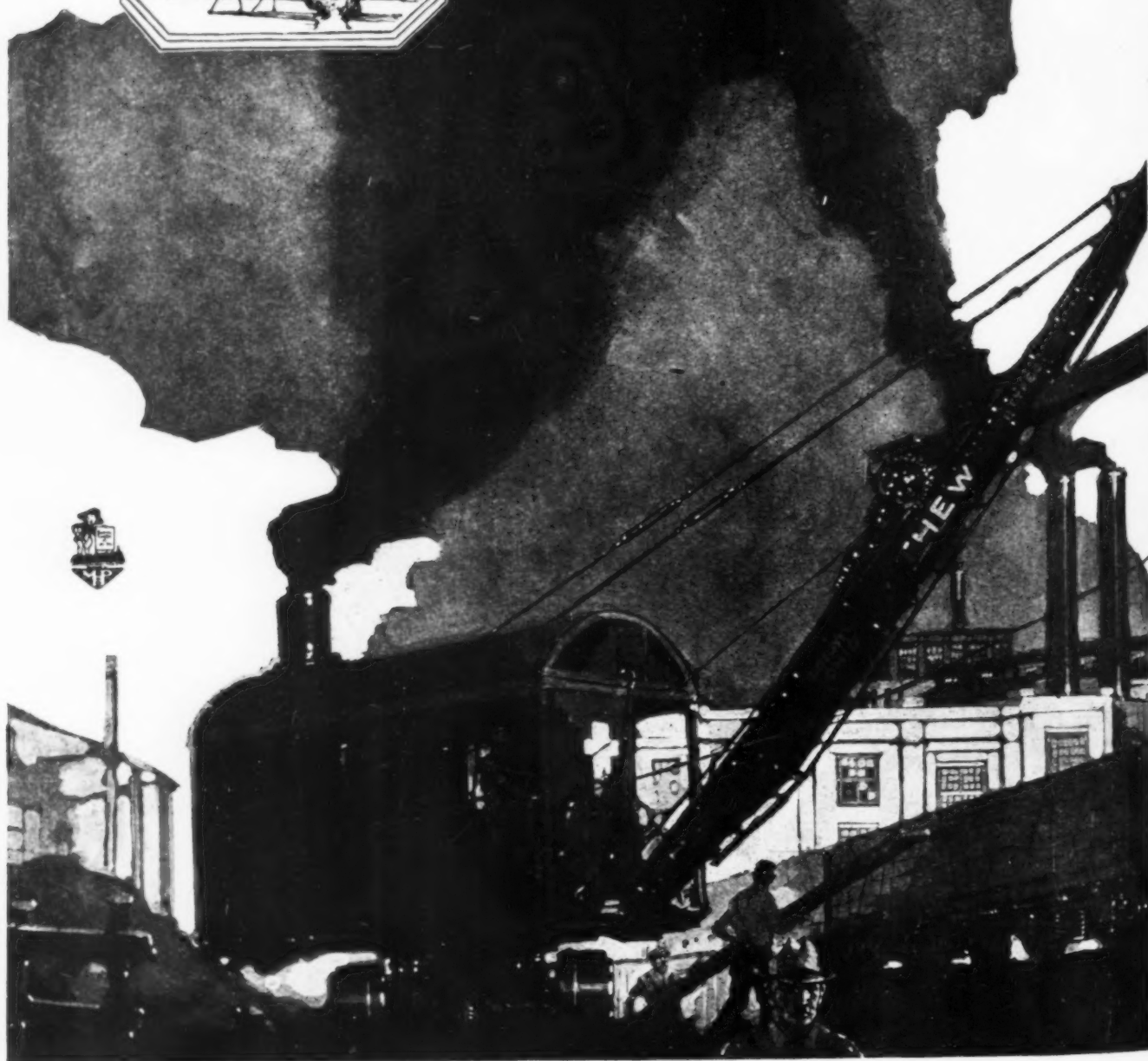
THE WYOMING SHOVEL WORKS

WYOMING, PENNA., U. S. A.





End



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